Another new development using

B. F. Goodrich Chemical *raw materials*

Arrows show use of Hycar rubber in typical mountings.

Accounting machine manufactured by The National Cash Register Co., Dayton, Ohio. B. F. Goodrich Chemical Co. supplies the Hycar rubber only.

Where smooth operation is needed—

HYCAR'S THE ANSWER!

HERE'S the newest all-purpose National Accounting Machine that marks a big step forward in automatic accounting. For even with its many mechanized features, vibration is reduced to a minimum, thanks to Hycar's help. Ten brackets and mountings, containing Hycar rubber, are strategically placed to absorb shocks and effectively reduce machine vibration.

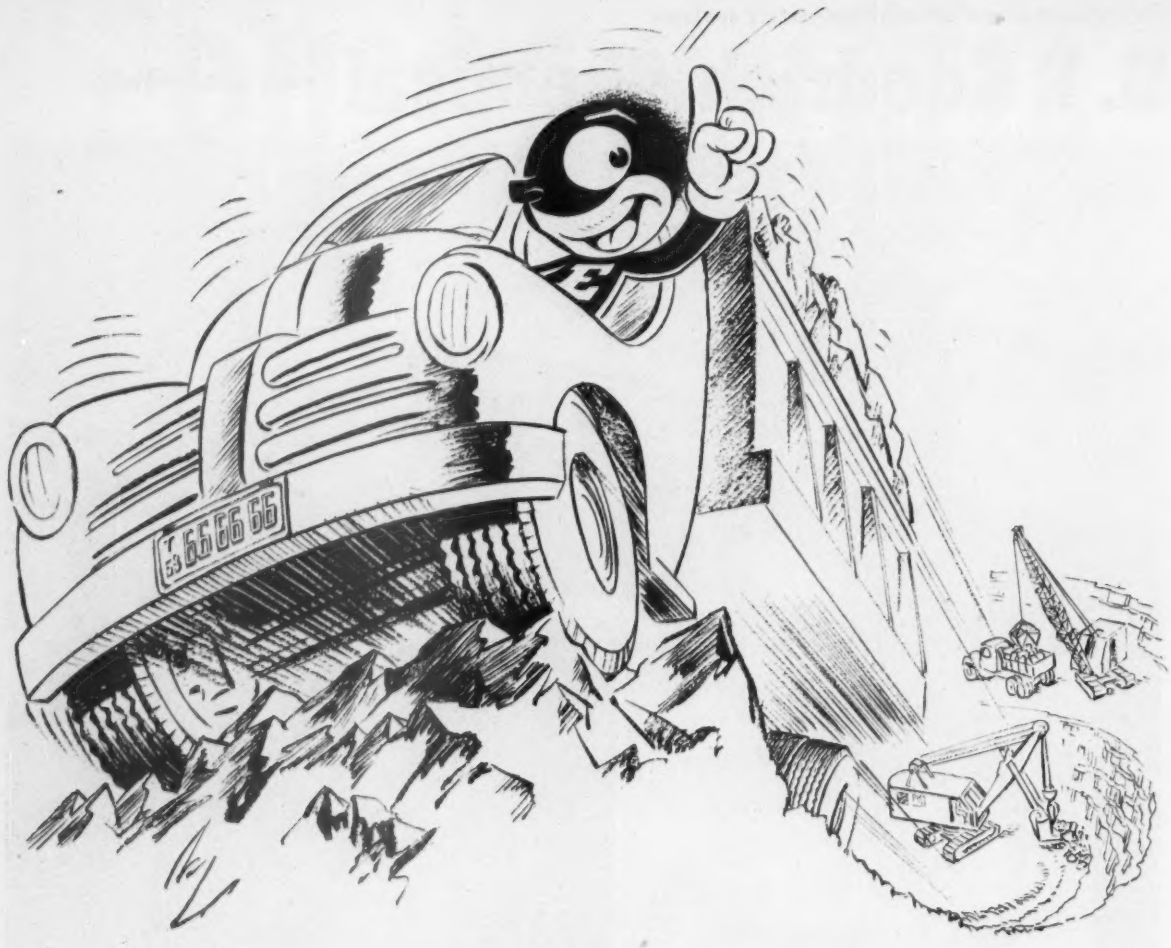
That's just one advantage Hycar gives the machine *and* the manufacturer. Hycar also resists the deteriorating effects of lubricating oils and greases used on office machinery. It won't harden or lose its resilience with age. The Hycar rubber is easily molded onto metal machine supports or other vital operating parts. And it will not distort or change shape when tightened in place.

What can Hycar do to help you improve or develop products to bring in more sales? Hycar rubber compounds resist heat and cold, gas, oil, aging, abrasion and many chemicals. For helpful technical information, please write Dept. HB-2, B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, Ohio. Cable address: Goodchemco In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Hycar
Reg. U.S. Pat. Off.
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors



New Philblack* E *is really super! Abrasion resistance? Super duper!*

Longer mileage than ever before! That's the record made by cold rubber tire treads with Philblack E . . . under severe road test conditions! Yes, 35% to 42% better than HAF black, in tests on passenger cars!

And in natural rubber truck tire treads, this SAF black proved to be 12% to 24% better than EPC black.

This superior wear resistance Philblack E gives is combined with outstanding protection against cut and crack growth. These two qualities make Philblack E especially valuable for tire treads, industrial belts, and other products that must stand up under severe conditions. It beats any black previously marketed!

For full information, consult our technical sales representative who calls on you or write our nearest office.

PHILLIPS CHEMICAL COMPANY

PHILBLACK SALES DIVISION

EVANS BUILDING · AKRON 8, OHIO

PHILBLACK EXPORT SALES DIVISION · 80 BROADWAY · NEW YORK 5, N. Y.

* A Trademark

Philblack E, Philblack O and Philblack A are manufactured in Borger, Texas. Warehouses in Akron, Boston, Chicago and Trenton. West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.

For Exceptional Clarity in Films—

look to and through

PLIOVIC G80V

Here's picture proof—a 30 mil sheet of PLIOVIC G80V—fused at only 310°F. Note the glass-like clarity and complete absence of unfused particles.

Properties of PLIOVIC G80V

Composition	100% Polyvinyl Chloride
Form	White Powder
Wet Sieve Analysis	100% through 40 mesh
Specific Gravity	1.40
Bulking Value	44 lb./cu. ft.
Intrinsic Viscosity	0.80
Solubility	Very Limited
Color	None
Taste	None

Really different is PLIOVIC G80V—newest of the polyvinyl chloride resins by Goodyear.

Just introduced, PLIOVIC G80V is already setting new standards for fast, easy processing and exceptional film clarity at low temperatures. Processing and fusion temperatures as low as 310°-330° F. give increased production at decreased cost – without sacrifice of film quality.

PLIOVIC G80V is carefully polymerized to give the exact molecular structure and weight needed for rapid fluxing. It also is designed to resist heat and light, should extended processing or higher temperatures be used.

Films and sheeting made with PLIOVIC G80V have good physical properties and fabricating characteristics. Where desired, soft stocks for easy coating of fabrics and excellent penetration between fibers are readily produced.

Take a look at the properties of PLIOVIC G80V, then write for samples. Ask also about PLIOVIC G90V. Write to:

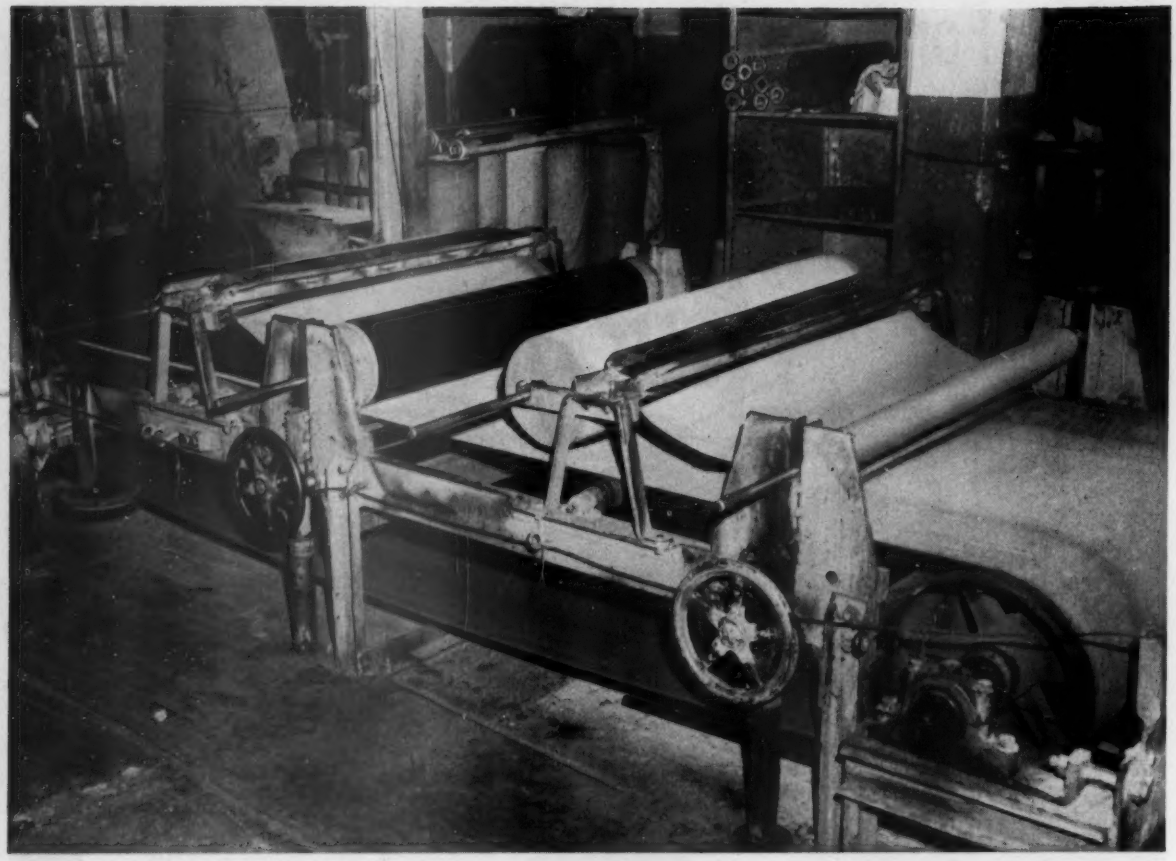
Goodyear, Chemical Division, Akron 16, Ohio

Chemigum, Pliobond, Pliolite, Pliovic—
T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

CHEMICAL
GOODYEAR
DIVISION

We think you'll like "THE GREATEST STORY EVER TOLD"—every Sunday—ABC Radio Network—
THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

Use-Proved Products — CHEMIGUM • PLIOBOND • PLIOLITE • PLIOVIC • WING-CHEMICALS — The Finest Chemicals for Industry



CLIMCO LINERS—

to Preserve and Protect Gum Rubber Sheets

Gum rubber sheets are being rolled into durable, clean liners from the calender. Climco Processed Liners preserve sheet stock; exclude air, moisture, sunlight, maintain tackiness; protect your stock from oxidation, mould, bloom, lint and ravelings.

Climco Processed Liners have been used for 31 years to speed production because they:

Insure better separation
Save power
Eliminate production headaches
Reduce stock losses
Give greater latitide in compounding
Offer longer liner life

TRY THEM IN YOUR PLANT

THE CLEVELAND LINER & MFG. CO.
5508 Maurice Ave. • Cleveland 27, Ohio

GET THE FULL STORY ON CLIMCO PROCESSING

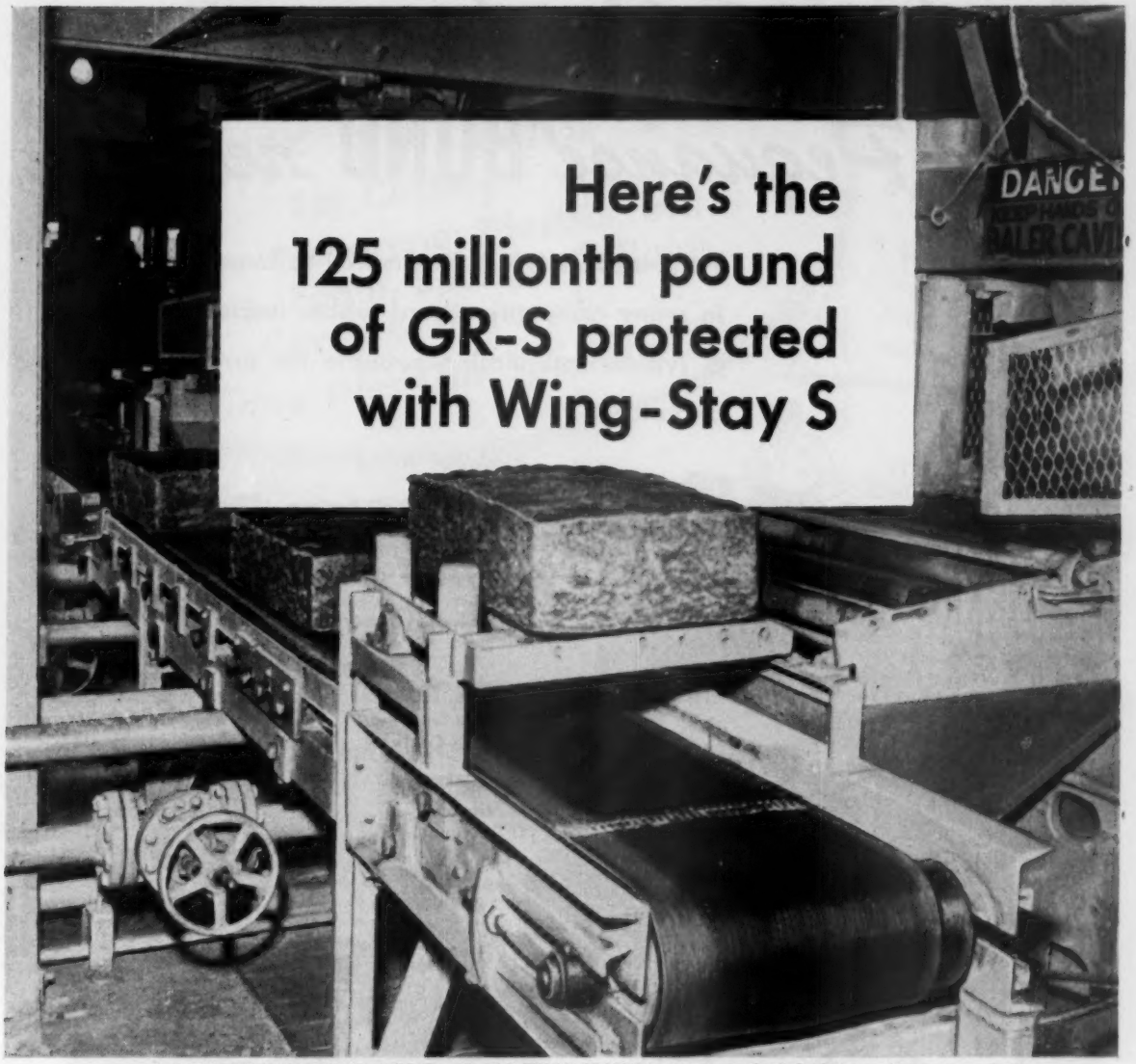
Illustrated booklet tells about Climco Liners and Linerette separating paper. Tells how to get better service from liners. Write for your copy now.

LINERETTE INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

CLIMCO
PROCESSED LINERS

FOR FASTER, BETTER PRODUCTION AT LOWER COST

THE CLEVELAND LINER & MFG. CO. TRADE CLIMCO MARK CLEVELAND, OHIO, U.S.A.



125 MILLIONTH POUND of GR-S made with WING-STAY S in 1952 is in this bale shown on its way to packaging.

LAST year WING-STAY S was used to protect more than 125,000,000 pounds of GR-S by incorporation during manufacture—more non-staining GR-S than was protected with all other non-staining antioxidants combined.

Reason why WING-STAY S is the first choice of the rubber industry is its ideal combination of antioxidant protection, non-discoloring and non-staining properties and low cost. Its incorporation—in either natural or synthetic rubbers—means white and light colors that remain unmottled and clean-looking, and rubber protected against oxidation.

For your best protection in 1953, specify WING-STAY S when you buy these GR-S Polymers:

GR-S 1006 hot synthetic rubber
GR-S 1012 hot synthetic rubber
GR-S 1502 cold synthetic rubber
GR-S X-693 oil-extended synthetic rubber

and when using other rubbers, natural or synthetic, incorporate WING-STAY S in your own compounds. Write for further details today to:

Goodyear, Chemical Division, Akron 16, Ohio

Chemigum, Pliobond, Pliolite, Pliovic, Wing-Stay—
T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

CHEMICAL
GOODYEAR
DIVISION

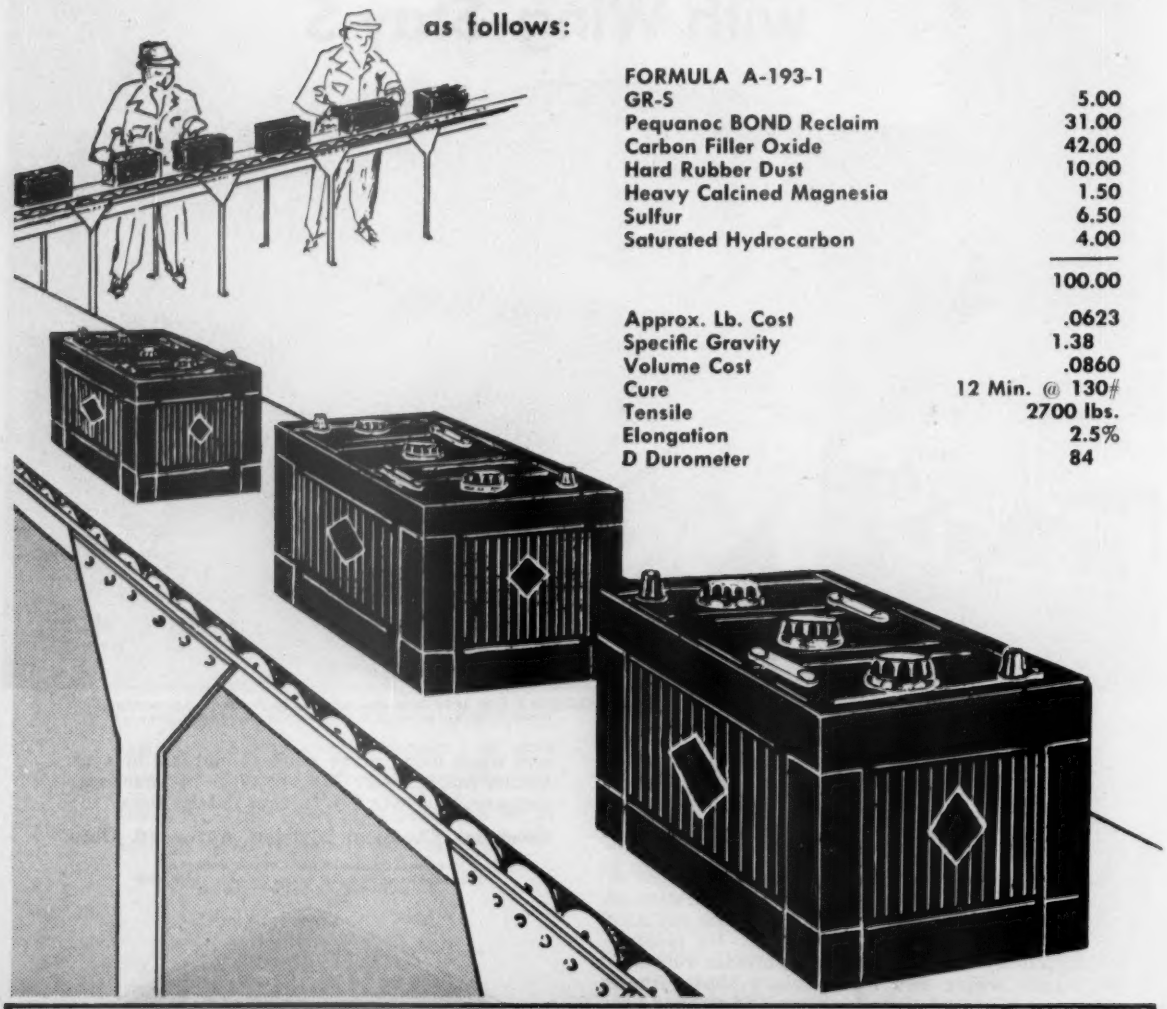
Use-Proved Products — CHEMIGUM • PLIOBOND • PLIOLITE • PLIOVIC • WING-CHEMICALS — The Finest Chemicals for Industry

We think you'll like "THE GREATEST STORY EVER TOLD" — every Sunday — ABC Radio Network — THE GOODYEAR TELEVISION PLAYHOUSE — every other Sunday — NBC TV Network

For hard rubber battery parts use Pequanoc **BOND** *reclaim*

Pequanoc BOND Reclaim has found application in many competitive hard rubber items.

A typical formulation suitable for battery cases is as follows:



FORMULA A-193-1	
GR-S	5.00
Pequanoc BOND Reclaim	31.00
Carbon Filler Oxide	42.00
Hard Rubber Dust	10.00
Heavy Calcined Magnesia	1.50
Sulfur	6.50
Saturated Hydrocarbon	4.00
	100.00
Approx. Lb. Cost	.0623
Specific Gravity	1.38
Volume Cost	.0860
Cure	12 Min. @ 130#
Tensile	2700 lbs.
Elongation	2.5%
D Durometer	84

Pequanoc Rubber Co.

MANUFACTURERS OF RECLAIMED RUBBER

MAIN SALES OFFICE and FACTORY: BUTLER, N. J.

RUBBER FABRICATORS NEED ACCURATE CUTTING DIES

For Cutting

Rubber, Neoprene, Plastics, etc.
Sheeting, Foam, Sponge, Cellular,
Cured & Uncured

Gang Dies Our Specialty

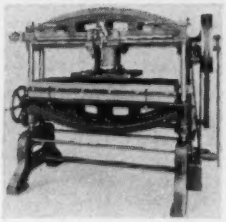
- Accuracy to close Tolerances
- Durability
- Genuine Understanding of the problems of rubber goods manufacturers

MALLET HANDLE DIES

PURPOSE — For those who have no machinery and do not wish to purchase any. For Cutting — Rubber, Neoprene, Plastics, etc.

ADVANTAGE — Cut direct from bolts or not.

SERVICE—One to three days.



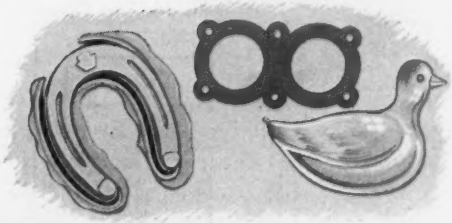
STEEL RULE CLICKER DIES

Use On Clicker Machine or Dinker Press

PURPOSE—For Cutting Rubber, Neoprene, Plastics, etc.

ADVANTAGE — More reasonably priced than the all steel dies. Recommended for small and medium quantities where cost of an all steel die is not warranted.

SERVICE—One day service.



Dies for cutting
Gaskets, flashing from molded parts, rubber soles, foam and sponge for furniture padding, inflated toys, clothing and footwear, etc.

STEEL RULE CUTTING DIES

Used on Die Cutting Press, Printing Press or Power Press

PURPOSE — Especially suited for cutting — Rubber, Neoprene, Plastics, etc.

ADVANTAGE—Low in cost. Suitable for long production runs. It is necessary to cut from rectangular sheets which are fed into the press.

SERVICE—One day service.

ALL STEEL DIES

Use On Clicker Machine or Beam Press or Power Press

PURPOSE—For Cutting—Rubber, Neoprene, Plastics, etc.

ADVANTAGE — Cut direct from rolls without first cutting into sheets.

SERVICE—One to three day service on dies.

DIE CUTTING SERVICE

PURPOSE—For those who prefer to have their cutting done by others.

ADVANTAGE—We can die cut your product for you on our own presses rapidly and economically at a low "per thousand" cost.

SERVICE—One to three days.

SAME DAY SERVICE

ACCURATE

STEEL RULE DIE MANUFACTURERS

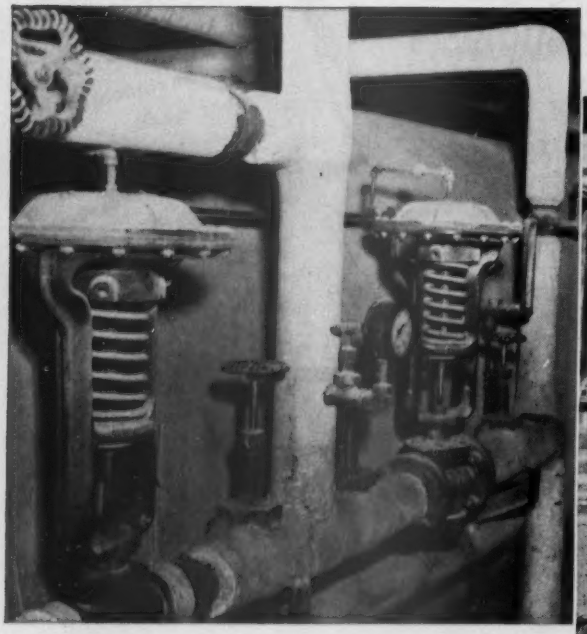
24-28 West 21st Street, New York 10, N. Y. CHelsea 2-0860-1

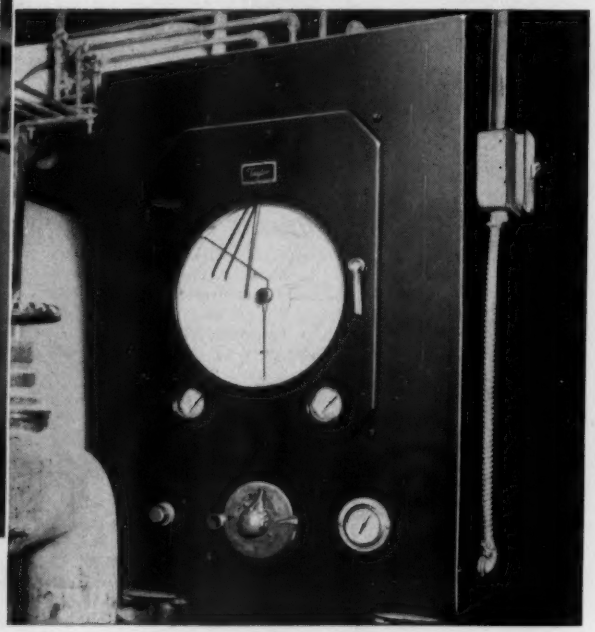
Subsidiaries: American Fabricators; Interstate Die Cutting Co., Inc.

Intelligent Service to the Rubber Goods Industry for Over 22 Years

SURE CURE

AT LOWEST COST





YES, this Taylor Vulcanizer Control System is delivering consistently uniform cures at lowest cost for the Goodyear Tire and Rubber Company, Akron, Ohio. It's a Taylor Packaged Unit with Double Duty Process Timer—running one of a battery of big mechanical goods vulcanizers. The operator simply loads the vulcanizer and sets the cure time. Then Taylor Control takes over with an automatically coordinated system of time and temperature . . . faithfully repeating each cycle again and again. Results for Goodyear—

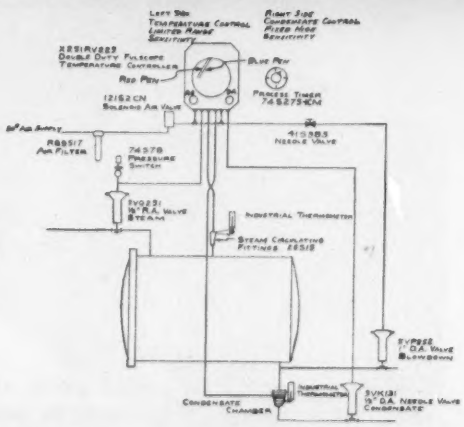
Increased production through increased efficiency . . . fewer rejects.

Greatly reduced costs through steam savings.

A big saving in manpower. Operators released for other duties—and *from* all responsibility for efficient processing.

We believe there's a moral in this Taylor Packaged Unit story for anyone who's interested in closely coordinated control of any important rubber process. It might be called *instrumental teamwork*, and it breaks down into three points:

1. **The instruments in every Taylor Packaged Unit are designed from the very beginning to work together.**
2. **You have the economy and dependability of simple air-operated control.**
3. **You have a complete control system in one neat, compact package . . . good housekeeping for your plant and easy maintenance for your men.**



Ask your Taylor Field Engineer! He'll analyze your problem, then he'll turn the job over to Taylor Application Engineers, specialists in instrumentation. Taylor Instrument Companies, Rochester, N.Y., and Toronto, Canada.

▼ ▼ ▼

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

Here's a **LOW COST** *answer to many* **BASIC RAW MATERIALS** *problems...*

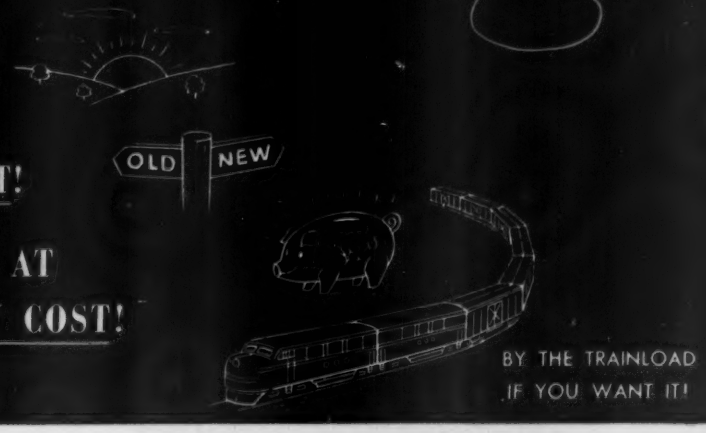
Piccopale

A 100% Polymerized Petroleum Resin

COMPLETELY NEW!

ENTIRELY DIFFERENT!

READILY AVAILABLE AT LOW COST!



BY THE TRAINLOAD IF YOU WANT IT!

PICCOPALE is a completely new synthetic resin, offering many money-saving and product-improving advantages. It is chemically inert—not affected by acids and alkalies; it is moisture-proof; its initial color is good and stability is fair; it is compatible with a very wide range of products, including waxes, rubbers, polyethylene, coumarone-indene resins, phenolics, rosins and esterfied rosins, many alkyds and vinyls, and most drying oils. PICCOPALE is soluble in naphthas, chlorinated solvents and long-chain oxygenated solvents.

PICCOPALE is available in enormous quantities—by the trainload if you want it—and priced so low that it can be used as a basic raw material.

Distributed by Harwick Standard Chemical Co., Akron 5, Ohio

PENNSYLVANIA
INDUSTRIAL CHEMICAL CORP.
Clairton, Pennsylvania
Plants at Clairton, Pa.; West Elizabeth, Pa.; and Chester, Pa.

PENNSYLVANIA INDUSTRIAL CHEMICAL CORP.
CLAIRTON, PENNSYLVANIA

Please send sample of PICCOPALE for (*application*)

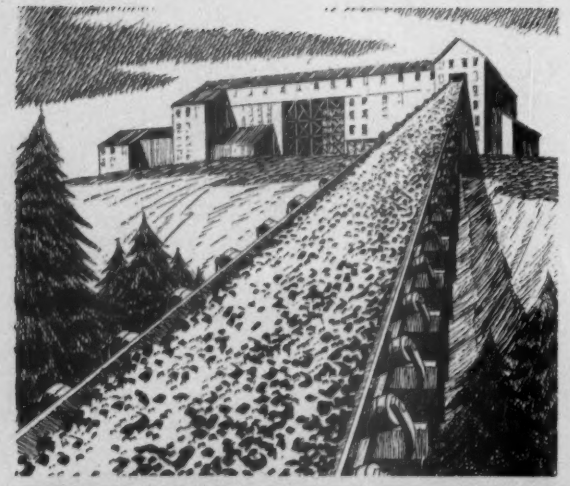
_____

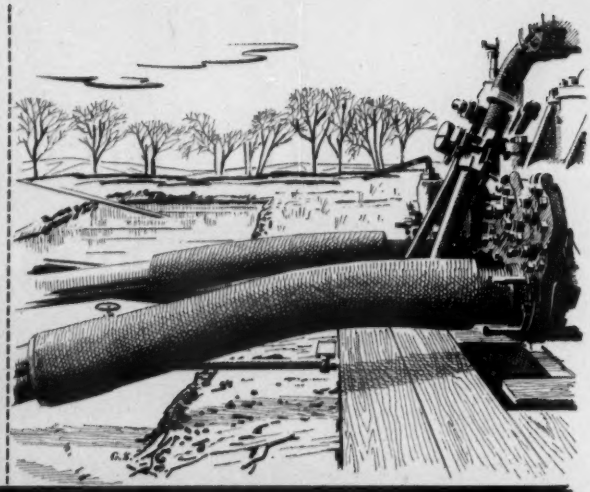
(*check*) **solid** ☐ **flaked** ☐ **liquid solution** ☐

Name_____

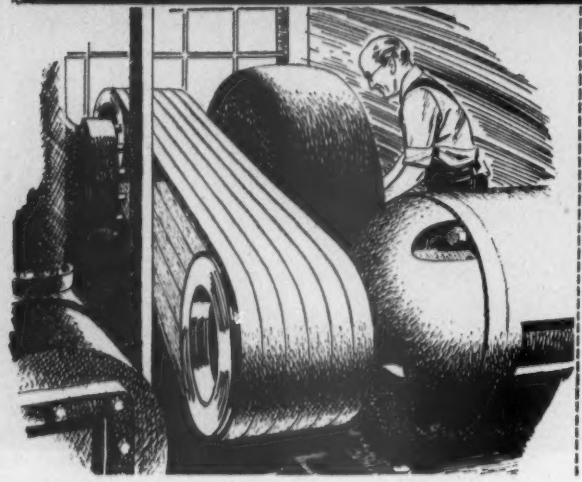
Company_____

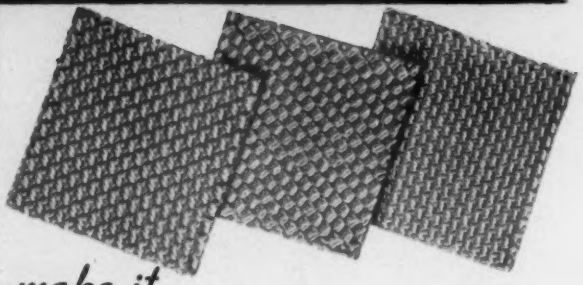
Address_____





If it's got to give DURABLE PERFORMANCE





make it "Wellington Sears Fabrics" superior for a wide variety of rubber applications

Any listing of Wellington Sears fabrics and their applications in the rubber industry can at best be but a partial one. In industry, the military and the home... in conveyor belts, hoses and other mechanical rubber goods... in pump and air compressor diaphragms, pontoons and raincoats ... in thousands of rubber-and-fabric applications, you're sure to find Wellington Sears fabrics on the job.

Backed by more than one hundred years' experience in the industrial fabric field, Wellington Sears offers an extensive line of modern cotton and synthetic fabrics for rubber fabrication. These are available in standard, as well as special, constructions to meet unusual requirements.

Whatever the problem, a call or letter to your nearest Wellington Sears sales office will place at your disposal the facilities of this "headquarters for industrial fabrics" and its engineering-technical staff.

An illustrated 24-page booklet filled with valuable facts on fabric development and applications of interest to present and potential users of industrial fabrics is yours for the asking. Write for a free copy of "Modern Textiles for Industry" to Wellington Sears Co., Department L-6, 65 Worth Street, New York 13, N.Y.

Superior Fabrics for the Rubber Industry

- Belting duck
- Hose duck
- Enameling duck
- Army duck
- Single and plied-yarn chafers
- Sheeting
- Airplane cloth
- Balloon cloth
- Nylon, high-tenacity rayon, other synthetics and combinations.

Wellington Sears

A SUBSIDIARY OF WEST POINT MANUFACTURING COMPANY

FIRST In Fabrics For Industry

WELLINGTON SEARS COMPANY, 65 WORTH STREET, NEW YORK 13, N. Y.

OFFICES IN: ATLANTA • BOSTON • CHICAGO • DETROIT • LOS ANGELES • NEW ORLEANS • PHILADELPHIA • SAN FRANCISCO • ST. LOUIS

For good whiteness . . . or true blues
in rubber or plastic tile
specify Calco's

ULTRAMARINE BLUE

59-1824
59-3584
59-5604
59-6204

High resistance to alkalis and soaps

For maximum brilliance in whites specify UNITANE® 0-220 (Titanium Dioxide) . . . for maximum strength and hiding, UNITANE OR-350.

You get highest color purity in Calco's Ultramarine Blues. Calco types are formulated to cover a wide range of shade, clarity and strength to give maximum versatility in compounding.

You can make your selection of these popular pigments according to the properties listed in the table—or call in your Calco representative for complete information.

	Tint
Calco Ultramarine Blue 59-1824	Reddest
Calco Ultramarine Blue 59-3584	Intermediate (Med. Red)
Calco Ultramarine Blue 59-5604	Intermediate (Med. Red)
Calco Ultramarine Blue 59-6204	Greenest

AMERICAN Cyanamid COMPANY
CALCO CHEMICAL DIVISION, PIGMENT DEPARTMENT
BOUND BROOK, NEW JERSEY

Branches and Warehouses in Principal Cities

Calco®

"No experience necessary"?

Skellysolve for Rubber and Related Industries

SKELLYSOLVE-B. For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor in dried compound.

SKELLYSOLVE-C. For making quick-setting cements with a somewhat slower drying rate than those compounded with Skellysolve-B.

SKELLYSOLVE-D. For cements and variety of manufacturing operations. Good odor. Quick drying. Minimum of heavy, greasy compounds.

SKELLYSOLVE-H. For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve-D is desired.

SKELLYSOLVE-E. For use wherever a relatively slow drying solvent is desired.

SKELLYSOLVE-R. For general use in tire building and a variety of other manufacturing operations and cements. Reduces evaporation losses. Medium quick final dry. Lessens bloating and skinning tendency.

"Doc" MacGEE says: Experience is *more* than necessary in some fields . . . it is *vital*. In solvents, you can rely unreservedly on Skellysolve . . . for every shipment is backed by more than 20 progressive years of concentrated solvent experience.

You benefit from that experience in uniformity of solvent characteristics. One batch of Skellysolve is the same as the next because of the strict quality controls that check every step in the manufacturing process. Shipment after shipment gives you the same over-all solvent properties that safeguard your product's uniformly high quality—the best "advertising" any product can possess!

What solvent property is most important in your plant operations? Whether it's low end points, quick evaporation, reduced blushing tendency, low vapor pressure, minimum of unsaturates and pyrogenic decomposition products or a minimum of low and high boiling compounds—Skellysolve checks!

Compare Skellysolve, too, for controlled vapor pressure—assurance against bloated containers. And if rubber cements are your business, Skellysolve's minimum of low boiling compounds banishes worry about "seeds" in your products. High bonding strength is certain with Skellysolve's freedom from greasy residues.

You're invited to write for more complete technical facts. And if you have a special solvent application problem, see if the Skellysolve Technical Fieldman can help you. No obligation.

SKELLY

Skellysolve

SOLVENTS DIVISION, SKELLY OIL COMPANY
KANSAS CITY, MISSOURI

UNIFORMITY

Makes the Big Difference

In INDUSTRIAL Fabrics

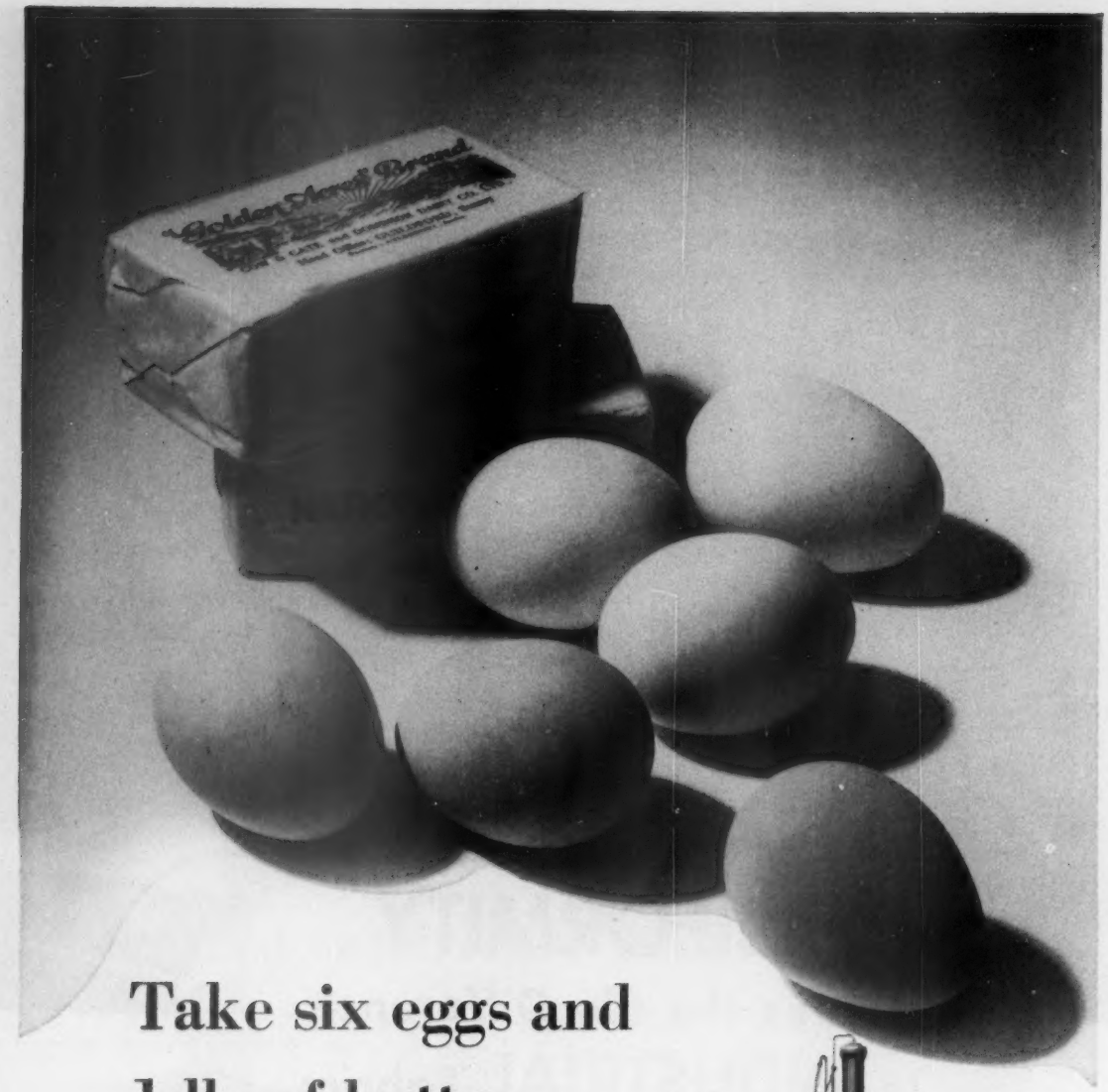
MT. VERNON FABRICS Give You Greater Fabric Uniformity

Shown is one of a series of laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products. Here fabric thickness after weaving is being gauged.

Mt. Vernon-Woodberry Mills

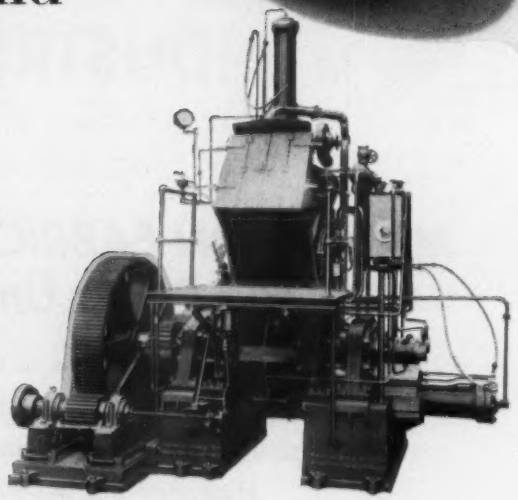
Branch Offices: Chicago • Atlanta • Baltimore • Boston • Los Angeles

TURNER HALSEY



Take six eggs and 1 lb. of butter

..... and so on. Mrs. Beeton certainly knew how to mix the best things to produce the best results. We've made a study of the subject of mixing too . . . for the last 72 years in fact, which is no doubt why people with problems of breaking down, mixing or blending natural and synthetic rubbers, plastics and many other materials, have realized that the Shaw Intermix is their answer.

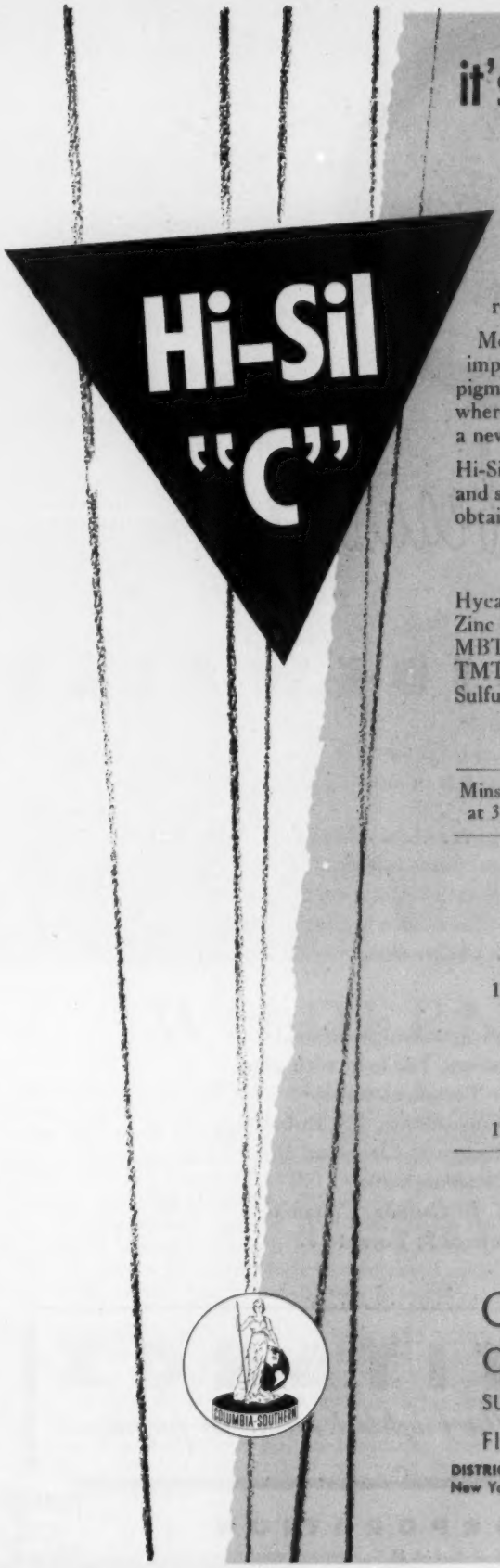


SHAW

Industry's headquarters for the best in Plastic & Rubber Machinery

FRANCIS SHAW & COMPANY LIMITED

MANCHESTER 11, ENGLAND
London Office: 34, Victoria Street, London S.W.1



it's good in nitrile rubber, too!

Do you want 4000 p.s.i. tensile strength in non-black nitrile rubber compounds? You can get it, together with tear resistance of almost 300 pounds per inch, by using Hi-Sil "C."

Hi-Sil "C" is the completely *new* hydrated silica which Columbia-Southern recently made available to the rubber industry.

Most compounders are familiar with the superior properties imparted to non-black rubber goods by regular Hi-Sil. This pigment has been accepted as standard in many vital uses where best quality must be obtained. Now, Hi-Sil "C" sets a new standard of quality, one that is even higher.

Hi-Sil "C" outperforms Hi-Sil in all elastomers, both natural and synthetic. The comparison below presents average figures obtained in a compounding series run on nitrile rubber.

Recipe

Hycar 1002 (OR-25)	100	25° m.p. Coumarone resin	12.5
Zinc Oxide	5	Dibutyl phthalate	12.5
MBTS	1.5	Stearic acid	1.5
TMTDS	0.5	Pigment (30 vol.)	58.5
Sulfur	2		

Test Results

Mins. Cure at 310°F.	Modulus 100%	Modulus 300%	Tensile	Elongation	Hard. 0"	Hard. 30"	Tear
			Regular Hi-Sil				
15	385	1775	2455	390	63	55	165
30	360	1785	2585	405	63	55	155
45	395	1775	2355	380	63	55	170
60	370	1775	2375	380	63	55	175
120	390	1795	2520	405	65	57	180
			Hi-Sil "C"				
15	300	1530	3750	505	64	56	275
30	320	1595	3820	500	65	57	260
45	320	1660	3680	480	65	58	290
60	340	1635	3885	495	65	59	265
120	335	1775	4000	495	66	58	275

Sample quantities of Hi-Sil "C" are available for your evaluation. Limited commercial shipments are ready from our interim plant production. Contact our Pittsburgh office.

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CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
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IN WHITE SIDEWALLS

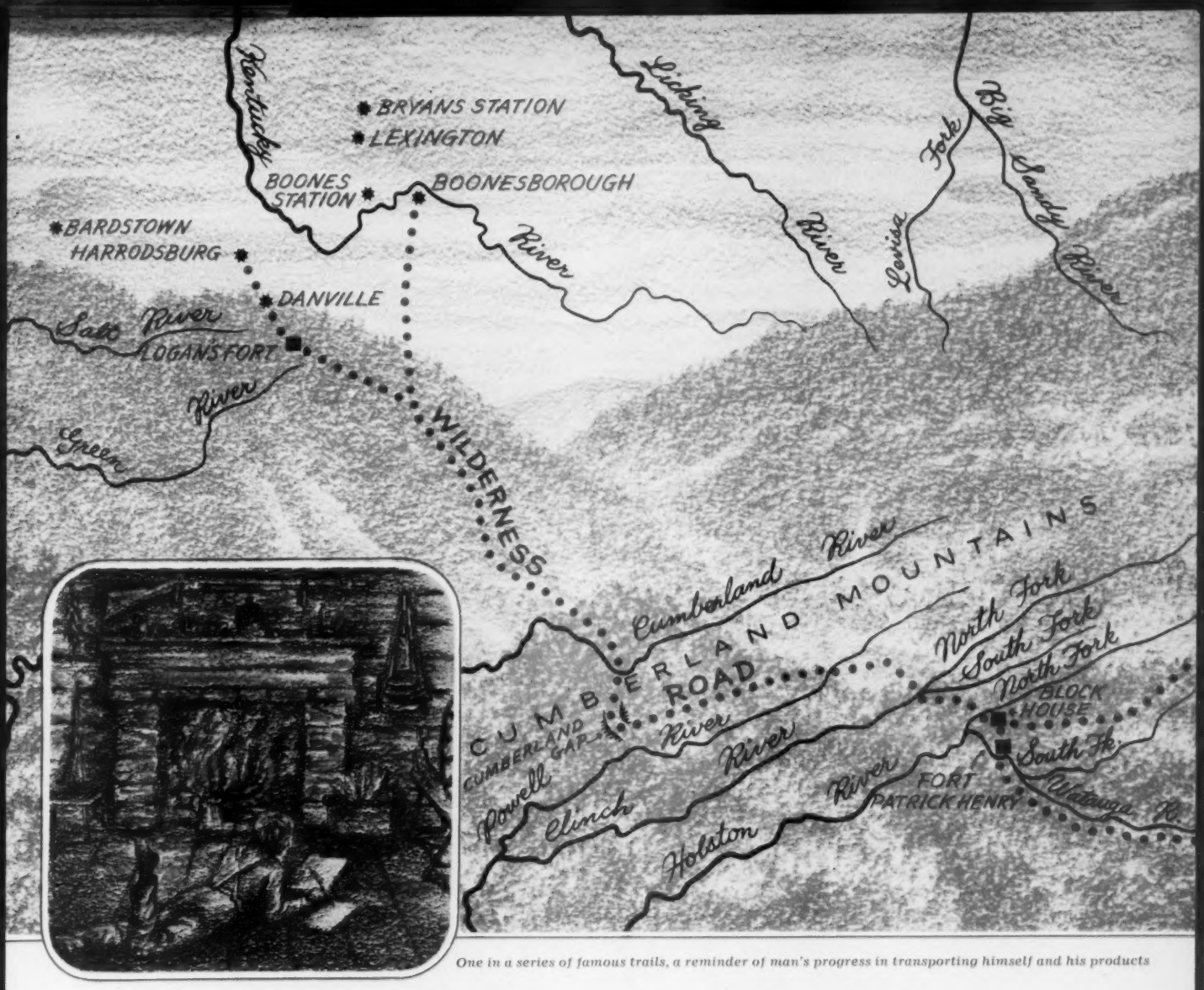
White sidewalls must be whiter and brighter than ever, to match the beauty of the new models in automobiles.

Purest whites at minimum loadings are obtainable with TITANOX titanium dioxide pigments. Some rubber formulators have found a bonus in TITANOX-RA-NC, too; for in their compounds this pigment fortifies rubber against crazing and checking as well as chalking . . . helps tires keep their original whiteness.

Rubber stocks of all kinds can be brightened, whitened or tinted *better* with TITANOX pigments. For help with your pigmentation problem, call on our Technical Service Department. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

® TITANOX
the brightest name in pigments

TITANIUM PIGMENT CORPORATION
Subsidiary of NATIONAL LEAD COMPANY



One in a series of famous trails, a reminder of man's progress in transporting himself and his products

WILDERNESS ROAD

In 1775, Daniel Boone and 30 men set out from Virginia to open the way into Kentucky, carrying with them rifles for protection and axes for chopping trees and underbrush. From the Cherokee Indians the Transylvania Company had purchased, at a cost of 10,000 pounds of trade goods, 20 million acres of land. The "Wilderness Road," which Boone and his 30 men opened, provided access for settlers who would travel its length from the Appalachians, over the Warrior's Path, through Cumberland Gap, to the fertile lands of the "dark and bloody ground."

In the year 1809, in a small log cabin in this area which the Wilderness Road had opened for settlement, there was born to Thomas Lincoln and his wife, Nancy Hanks Lincoln, a son whom they named Abraham after his grandfather. Grandfather Abraham had brought his wife and their family of five children out to Kentucky from Virginia in 1782, following the trail of his good friend and kinsman, Daniel Boone.

How narrow must have been the road cleared by Boone and 30 men; how great must have been the toil and labor for those who journeyed over it. Today the wilderness is no obstacle for those who build highways. With his powerful equipment, man opens the way through forests and over mountains. On this equipment is the rubber tire, equal to the weight placed upon it and the rough terrain over which it must roll.

How far man has progressed in his ability to transport himself and his products, and to build the highways over which he travels. Given the need, he masters the way. Carbon black has given strength and durability to the rubber tire, whether it is used in moving rock and earth or in transporting a family on a week-end trip. To its carbon blacks, UNITED CARBON COMPANY has provided for more than a quarter of a century an engineering and scientific skill which places them in the forefront of "rubber blacks."

UNITED CARBON COMPANY, INC.

We furnish the rubber industry with these well-known carbon blacks of outstanding quality —

UNITED BLACKS

Dixie 20 - - - - SRF – Semi-Reinforcing Furnace
Dixie 40 - - - - HMF – High Modulus Furnace
Dixie 50 - - - - FEF – Fast Extrusion Furnace
Dixie 60 - - - - HAF – High Abrasion Furnace
Dixiedensed S - - HPC – Hard Processing Channel
Dixiedensed HM MPC – Medium Processing Channel
Dixiedensed S-66 MPC – Medium Processing Channel
Dixiedensed 77 - EPC – Easy Processing Channel

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Discerning rubber compounders obtain their excellent results in a variety of stocks when using our quality blacks.

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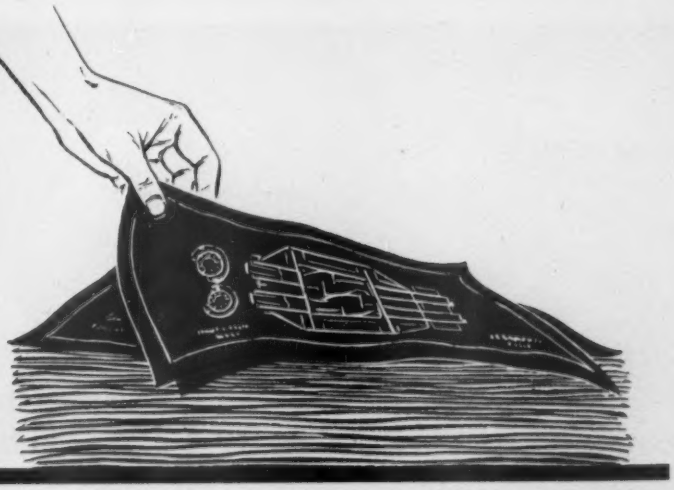
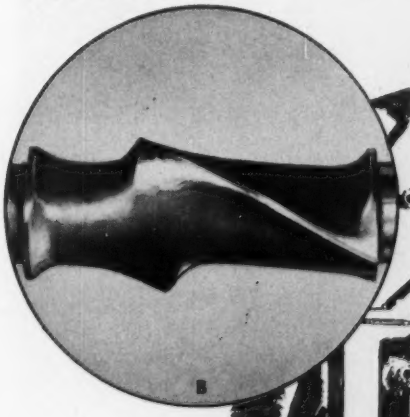
2200 sq. ft. of blueprints show us



HOW TO REBUILD YOUR BANBURY* MIXER

A This rotor is badly worn, but blueprints show us how much to build it up in order to return it to its proper size and shape.

B Here is the rebuilt rotor, ground smooth and to original contours.



These blueprints give the exact size and shape of every one of the 775 parts of your Banbury* mixer as it was originally built by Farrel-Birmingham.*

Without these drawings, it is extremely difficult to do a first-rate rebuilding job. When rotors, for example, are rebuilt to the wrong size or contour, incomplete mixing and inefficient production are the inevitable results.

At Farrel-Birmingham*, worn rotors are rebuilt to original dimensions in a sequence of 42 separate operations, including three nondestructive tests for soundness. Result: *rebuilt rotors are just exactly as good as new ones,* and carry the same guarantee.

The repair and rebuilding of other parts is handled with equally painstaking care. We know how to restore and often improve on the original working efficiency of each part, and we have the manufacturer's special interest in maintaining the reputation of the Banbury* mixer.

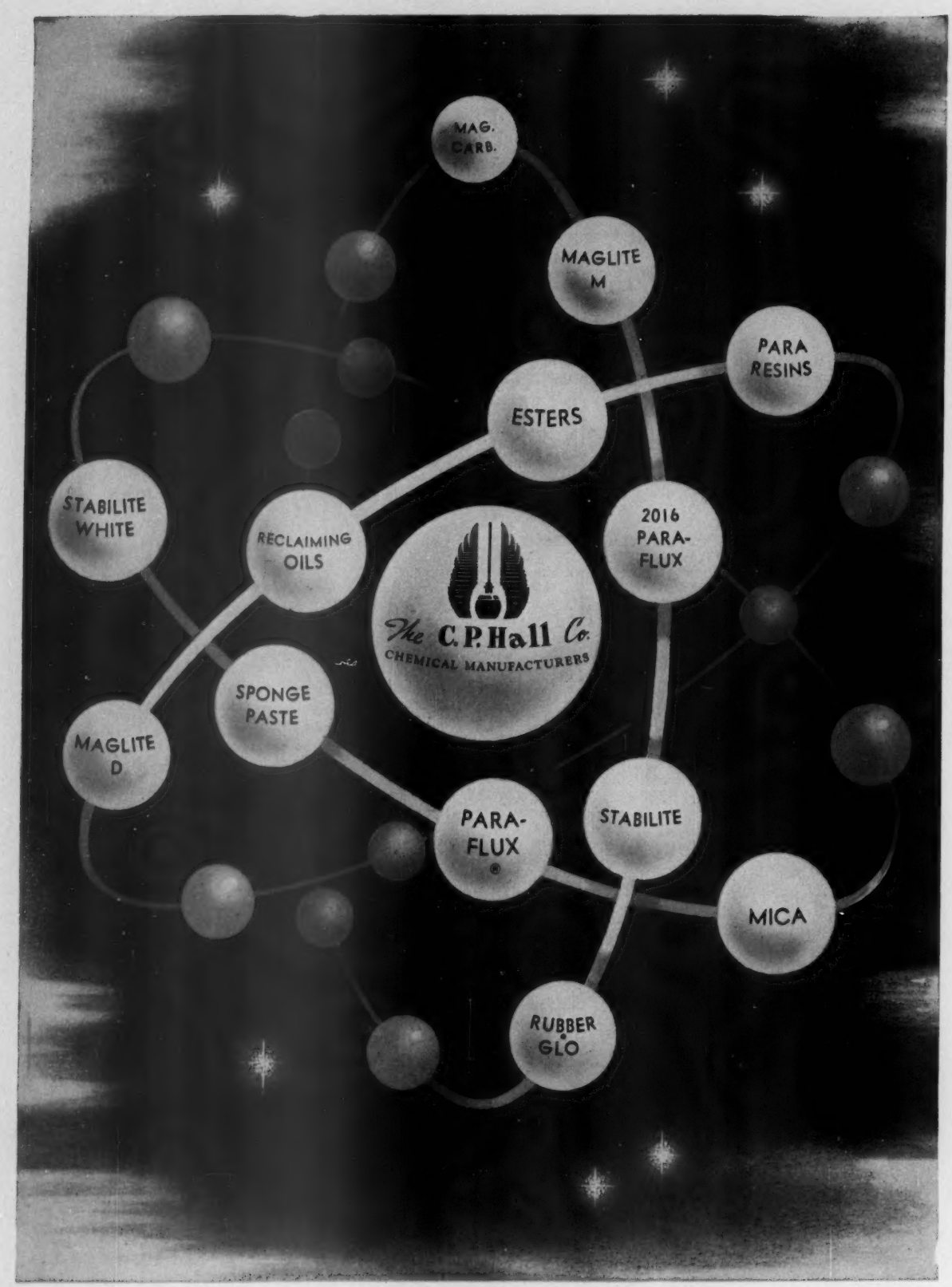
For the best in Banbury mixer repair work, write, wire or telephone one of the offices listed below.*

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN. (Telephone Ansonia 4-3331)
AKRON, OHIO, 2710 First National Tower (Tel. Jefferson 3149)
CHICAGO, ILLINOIS, 120 So. LaSalle Street (Tel. Andover 3-6434)
LOS ANGELES, CALIF., 2032 Santa Fe Avenue (Tel. Lafayette 3017)
HOUSTON, TEXAS, 860-A M & M Building (Tel. Preston 4472)

*Trade-marks of Farrel-Birmingham Company, Inc.

Farrel-Birmingham*

FB-804



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Get your guide to outstanding oil resistance!

Here's invaluable information for all users and potential users of nitrile type, oil-resistant rubber. *And it's yours for the asking!*

Compiled after intensive research, these six bulletins will show you the way to *greatly improved* oil resistance, *superior* low-temperature flexibility, *easier processing*, and a host of other remarkable advantages.

Bulletin #1 Describes the many different grades of Paracril,® their uses, properties, and basic compounding and processing. Effect of carbon black and non-black fillers, pigments, and plasticizers.

Bulletin #2 Detailed data on compounding for maximum resistance to organic solvents, fuels, animal and vegetable oils, and refrigerants. Index of chemical resistance of vulcanized elastomers.

Bulletin #3 Compounding recipes to meet particular military and ASTM specifications, together with general compounding recommendations for common applications.

Bulletin #4 Extensive information on acceleration systems, and their effects on Paracril compounds. Comparisons of the various types of plasticizers used with Paracril and the resulting properties.

Bulletin #5 Compounding for military specifications Mil-R-3065, SB Series—with laboratory data sheets including recipes and comparative test results.

Bulletin #6 Thorough working data on curatives and anti-oxidants and their use with Paracril to provide unusual combinations of properties.

These 144 pages of general and technical information illustrate how Paracril can help *you* produce finer oil-resistant rubber products.

If you haven't had a chance to review these important bulletins, please indicate the bulletins you're interested in and send the coupon below.

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Division of United States Rubber Company

Naugatuck, Connecticut

Naugatuck Chemical, 102 Elm Street,
Naugatuck, Connecticut
Please send Paracril Technical Bulletins, Nos. ..... to:

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HIGH QUALITY at LOW COST

for reinforced polyesters

If you're seeking ways to get better polyesters at low cost, let us recommend the right DIAMOND Precipitated Calcium Carbonate for your product.

You'll get smoother surfaces, no cracks, no evidence of glass fibers when DIAMOND Carbonates are mixed with catalyzed, glass-reinforced polyesters. And your product gets improved wet strength and reduced shrinkage.

All these at lower volume cost.

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Surfex® MM—coated with 1% resin; particle size about 5 microns.

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Multifex® MM—uncoated; particle size about .06 micron.

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An experienced Engineering Organization with the "KNOW-HOW" of rubber and plastics process engineering and machine design.

A machinery manufacturing plant with the "KNOW-HOW" resulting from years of experience in building quality equipment.

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This combination of Hale and Kullgren, Inc., and The Aetna-Standard Engineering Company offers a complete service to the rubber and plastics industry. We are equipped to deliver a complete plant, a specialized process, an engineering service or individual machines for processing rubber and plastics. For instance, some of our current projects are—a Phenolic Resin Molding Powder Plant; a Tire Manufacturing Plant; a Process for Manufacturing Plastic Pipe; a Compounding System and Mill Room for Mechanical Rubber Goods Plant.

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Whatever your requirements in plastics or rubber equipment or planning, address your inquiry to:
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Give us an outline of your needs and we will give you prompt and authentic information.

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REMEMBER THIS TREAD?

it is the original Firestone "Non-Skid" tread, first introduced in 1908

Many of you in the tire industry today will remember this famous tire of yesterday . . . and how it changed the concepts of tire tread designs, helping to bring a greater measure of safety on the road. It was one of the many milestones which marked the swift progress of the young tire industry.

Down through the years — since 1906 in fact — The Bridgwater Machine Company has consistently worked with the tire industry, helping it meet continually expanding demands for automotive tires by furnishing molds and equipment of highest quality.

Our Athens Machine Division, in Athens, Ohio, is, we believe, the only plant in the world devoted exclusively to tire mold making. Here, skilled workmen and specialized machines — many of our own design — produce molds of every size and type, in engraved steel, cast iron, or aluminum.

Here, unhampered by the necessity of spreading skills and equipment over a range of products, Bridgwater craftsmen make tire molds of superlative quality, and at decidedly favorable cost.

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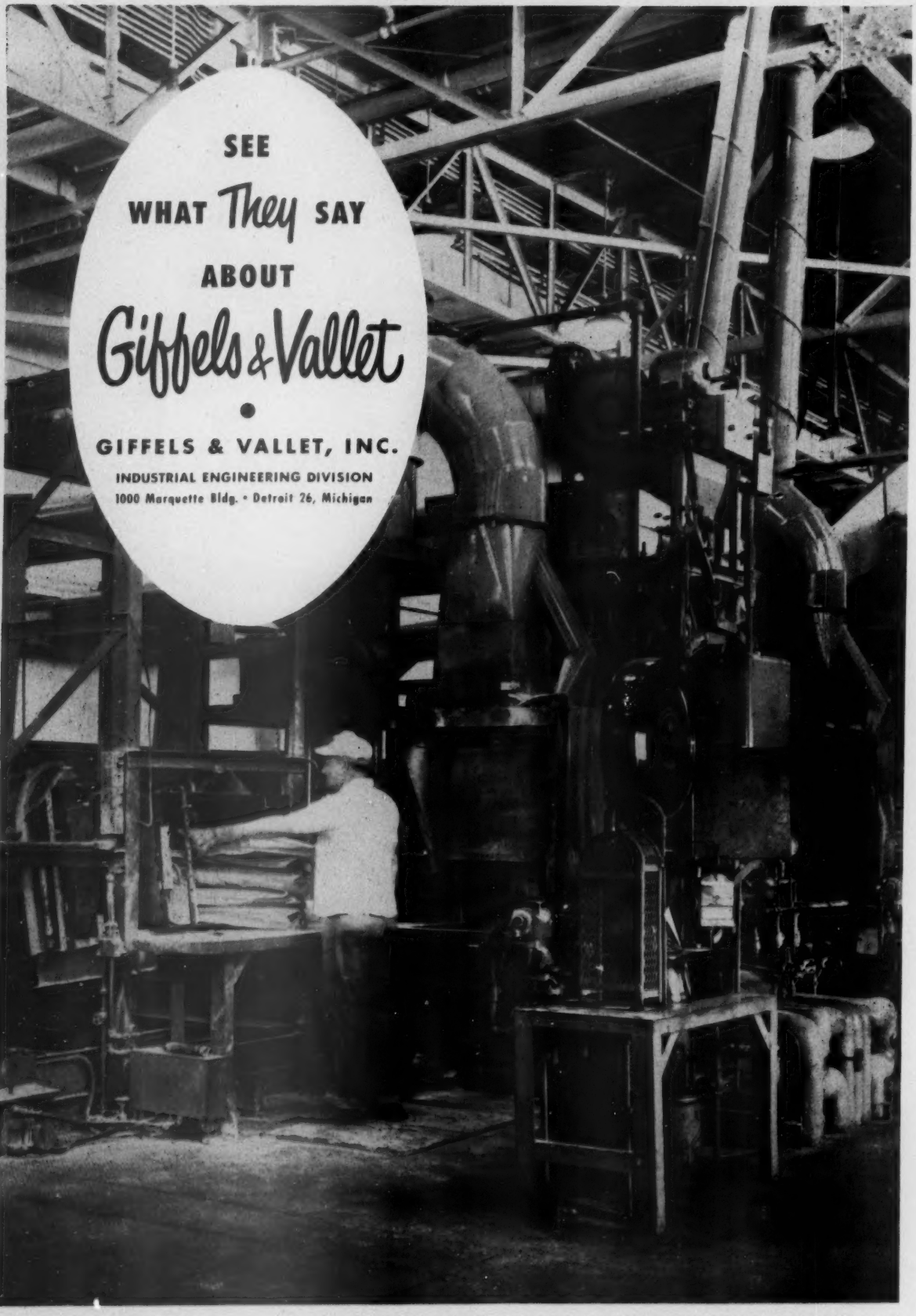
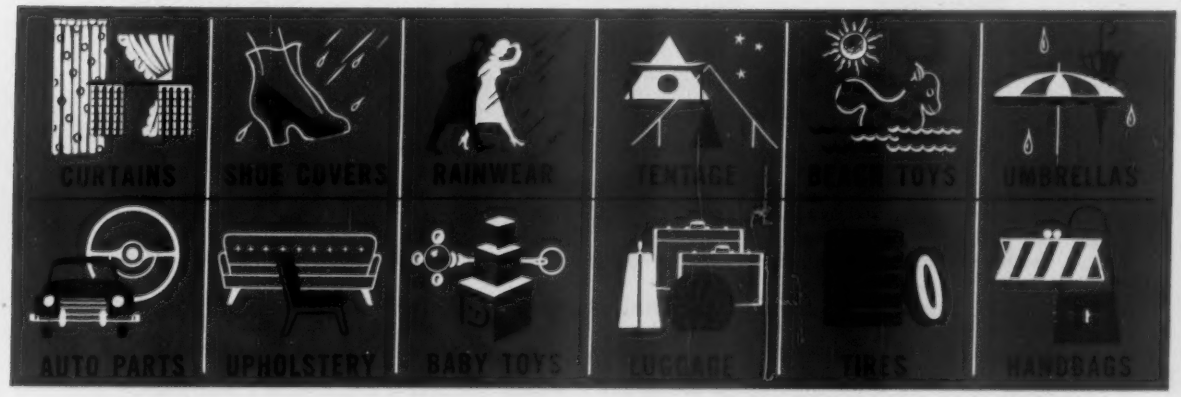


BANBURY CHARGING — WESTERN ELECTRIC COMPANY — BALTIMORE, MARYLAND

Drew produces a choice of Plasticizers for use in manufacturing a wide range of products requiring toughness, permanence and flexibility under extreme heat and cold. Outstanding among these Drew quality products is PLASTICIZER SC.

SC Offers extreme flexibility under extreme heat or cold, and assures reliability and permanence in the finished product. SC promotes wetting and dispersion of filler in production. Exceptionally stable and resistant to oxidation and rancidity, it is widely used in Vinyl Resins for high plasticizing action down to temperatures as low as —70°F.

Recommended for a wide variety of applications, including embossed surfaces, fabric coatings such as raincoats, tenting, car covers; shoe soles, wire and cable insulation, medical tubing, etc. SC is easily emulsified, and can be conveniently added to aqueous dispersion of synthetic resins and rubbers.



OTHER DREW PLASTICIZERS OFFER OUTSTANDING PROPERTIES

DP 200

An excellent all-purpose plasticizer with exceptionally low heat loss and low "sweat-out". Provides plastic action down to –50°F. DP 200 gives low brittle points to vinyl chloride plastics. Low viscosity—ideal as softener for synthetic rubber manufacturing.

DP 250

A light colored, low viscosity polymeric type plasticizer which retains the easy handling properties of lower weight monomeric types. Affords good low temperature flexibility, excellent resistance to heat and light aging. Very resistant to leaching action of oils. Produces good results as an aid in pigment wetting and grinding, extrusion and calendering.

DP 520

The protein plasticizer. Gives products flexibility, clearness, toughness, permanence and exceptional stability against humidity. Low susceptibility to heat or cold. Compatible with natural or synthetic resins. The plasticizer for casein, zein, soybean protein and synthetic rubber compounds. Ideal for making coatings, adhesives, impregnants, inks and other protein base products.

For complete details and technical data on all Drew Plasticizers, call or write

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BOSTON • PHILADELPHIA • CHICAGO

For maximum low temperature flexibility in natural and synthetic rubber

Specify Thiokol* PLASTICIZER TP-90B

Thiokol Plasticizer TP-90B is highly compatible with natural rubber, Neoprene, Buna N (nitrile type rubbers) and GR-S. It imparts excellent low temperature flexibility to these elastomers and maintains high resilience over a wide temperature range. It is both economical and efficient to use.

The following results illustrate the excellent low temperature properties imparted by Thiokol TP-90B:

	Natural Rubber	Neoprene GN	Hycar OR-15	Paracril-B	GR-S
TP-90B, p. h. r.	30	20	30	30	30
Cure, min. /° F.	30/310	45/300	30/310	30/310	30/310
Tensile, p. s. i.	2200	2600	2380	2250	1500
Elongation, %	530	410	300	350	380
Shore Durometer	42	68	70	61	45
Low Temperature Flexibility**	**–95°F**	**–70°F**	**–70°F**	**–80°F**	**–95°F**

**Determined according to a modification of ASTM method D 1043-49T. The temperatures shown are the values at which the absolute torsional moduli are 10,000 p. s. i. Although the specimens were still quite flexible, G10,000 was arbitrarily chosen as the stiffening point.

For technical information write:

Thiokol CORPORATION

This information is believed to be accurate. However, no warranty is expressed or implied regarding the accuracy of these data, or the use of this product.

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Typical Davis-Standard Heavy Duty Continuous Vulcanizing Machine for Hot or Cold Fed Compounds. Built in 3¼", 4½", and 6" Bore Sizes.

Insulated wire that is cured in a Davis-Standard Continuous Vulcanizer has a long and useful life expectancy. Its inherent stamina enables it to win loyal customers and build a healthy business for the wire manufacturer.

Equally important to the manufacturer are the ease, speed, and dependability with which the Davis-Standard Continuous Vulcanizer administers the cure. The machine is easy to set to the precise temperatures and conditions required by today's coatings, and will operate indefinitely in the severest service, without adjustment or shutdown.

For better production and better wire products, write for full information and specifications.

Our engineers welcome the opportunity to work with yours in the solution of any of your extrusion or vulcanizing problems.

EST. 1848

Oronite POLYBUTENES

economical extenders of rubber

Oronite Polybutenes are clear, light colored, chemically stable liquids of moderate to high viscosity and tackiness. They have excellent aging characteristics. They do not become gummy or waxy, do not harden, darken or change in any essential property over long periods of atmospheric exposure. They can be readily emulsified using standard techniques and equipment.

Polybutenes can be used as a rubber extender in the manufacture of a wide variety of molded rubber products such as rubber boots, garden hose, hot water bottles. Besides extending rubber, Polybutenes plasticize the mass of rubber making it more pliable for easy milling.

Oronite Polybutenes are used in milling reclaimed rubber batches and have a field of usefulness in plasticizing various synthetic rubbers.

Oronite Polybutenes are available in four grades, based on viscosity. Complete information is available in a technical bulletin.

Write or phone the Oronite office nearest you and talk over your problem with us.

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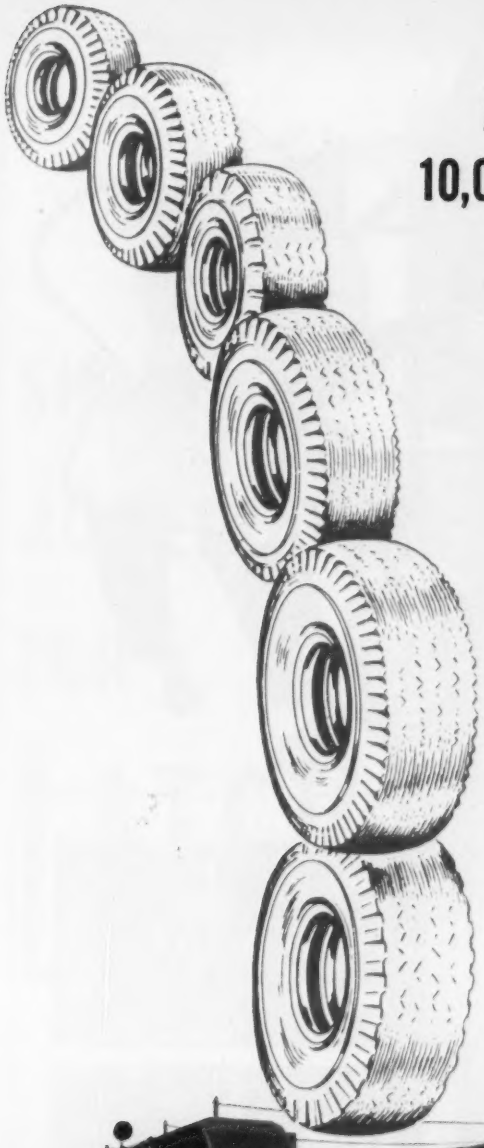


A NEW GIANT CRACKER WITH A 10,000-POUND-PER-HOUR APPETITE FOR WHOLE TIRE CARCASSES

Here is the largest and most powerful cracker ever built for the rubber industry. Equipped with 32″ x 54″ rolls, it is capable of chewing up whole tires, including the larger sizes such as are used on busses and trailer trucks, without prior debeading.

Carcasses can be ground to ½″ mesh, at a rate of 10,000 pounds per hour or even better. The rubber is stripped clean of the bead during the process.

The 32″ diameter rolls are of chilled iron, cored for water circulation. Both rolls are corrugated across the face, the back one with spiral saw teeth, and the front roll with straight "U" corrugations.

All gearing is enclosed in a separate 700 HP uni-drive connected to the rolls by universal spindles. This construction provides smooth and efficient transmission of power under the heaviest torque loads.

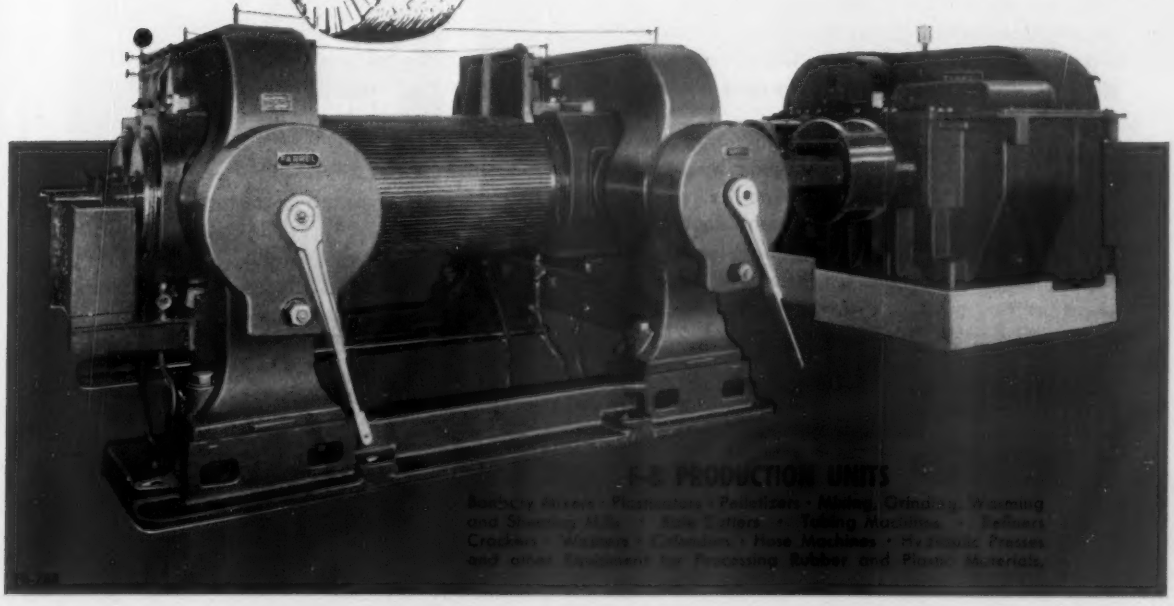
Housing and cap are cast integrally of high-strength Meehanite metal, making an extremely strong, one-piece structure. The rolls are removed endwise, so that it is not necessary to disturb any feed arrangement above the cracker when rolls are taken out for regrooving. This is an important consideration in service as severe as this.

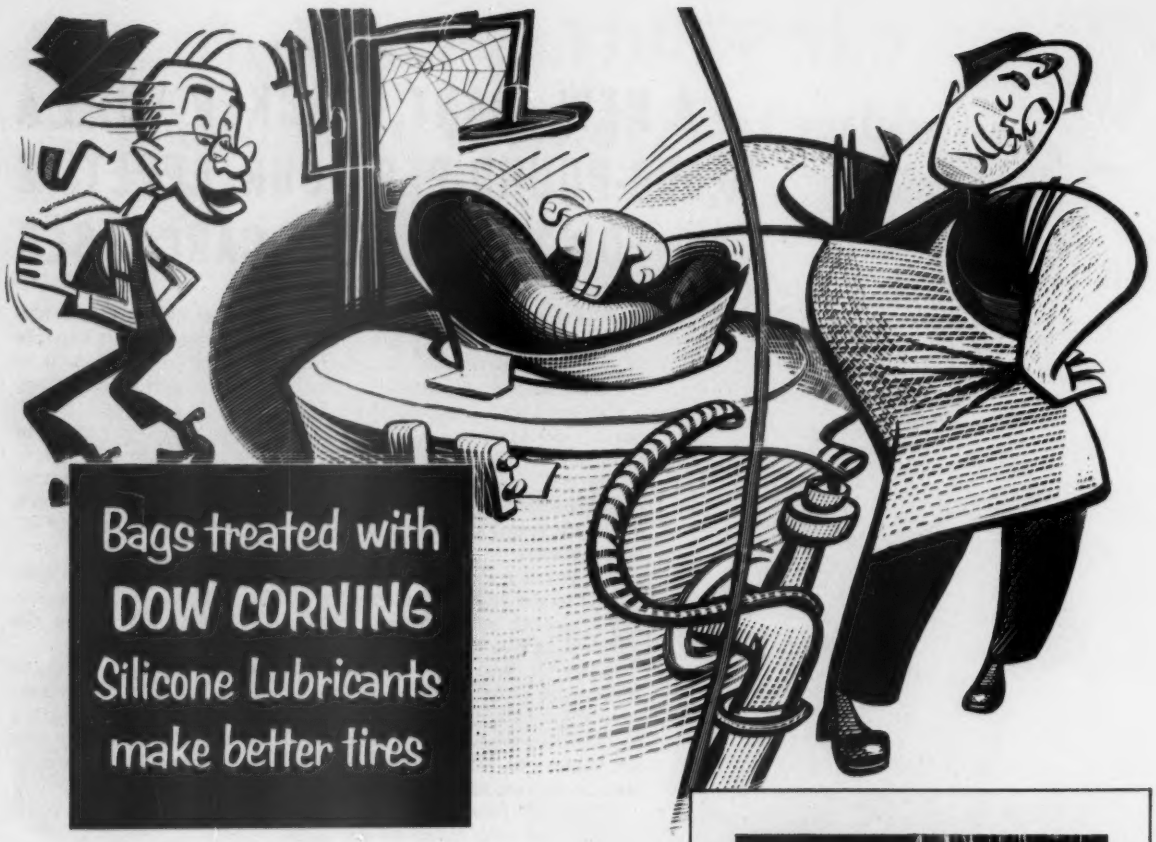
Write for further details about crackers or any of the other production units listed on this page.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

Farrel-Birmingham ®





Bags treated with DOW CORNING Silicone Lubricants make better tires

Moe Muscles knows how easy it is to handle bags properly treated with Dow Corning Emulsions. They slip smoothly into place and they come out without sticking. Same's true when he gets green carcasses treated with a solvent solution of Dow Corning Mold Release Fluid and talc.

And Inspector Mike loves those silicone bag lubricants too, because of the glossy black interior finish they give. Separated cords and loose tuck-unders are practically eliminated. Bags handle easier and maintenance costs are reduced substantially.

Silicone treated bags, like silicone lubricated molds stay in service longer. You get easier release of more accurate and highly finished tires free from blemishes inside and out. That's why most rubber companies here and abroad specify Dow Corning silicone mold release agents; emulsions for curing bags and molds; fluid for green carcass, bead and parting line release.

DOW CORNING SILICONES MEAN BUSINESS!

For more information call our nearest branch office or write for Data Sheet CM-2

DOW CORNING CORPORATION

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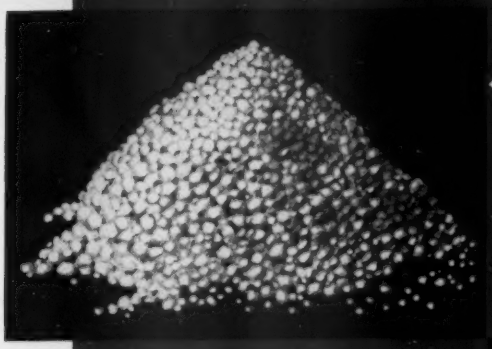

EXTRUDED
(the 9 series)
Non-dusting soft pellets for use in making ball and colloid mill dispersions.

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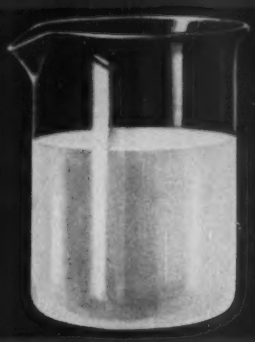
(the 7 series)
A 50% water suspension for addition to latex, in most cases without further treatment.



POWDER
For those who prefer accelerators in powdered form.

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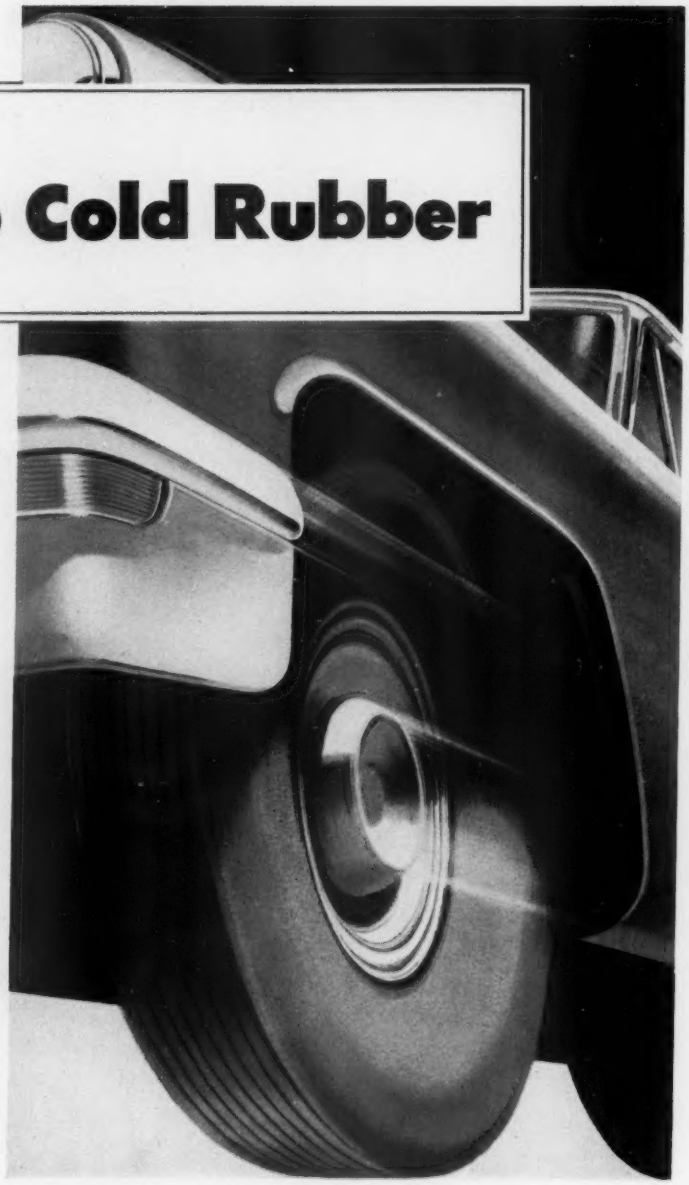
Shift to Cold Rubber



CHEMICAL PROBLEM...

. . . automobile tires that last longer under the heat and abrasion caused by today's higher operating speeds.

SOLUTION...

. . ."cold rubber", so called because it is made at 5° C. Cold rubber production requires a special emulsifier to bring together its basic ingredients—butadiene and styrene—under refrigerated conditions. The emulsifier found most satisfactory today, as when GRS-10 was introduced in World War II, is Dresinate®—one of many chemical materials produced by Hercules for the rubber industry.

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. . . tough, synthetic rubber that can be economically produced in quantity from readily available materials. Now used extensively for the treads of passenger car tires, cold rubber is also proving itself in truck service, for machinery belting, and other places where operating heat and abrasion combine to promote rapid wear.

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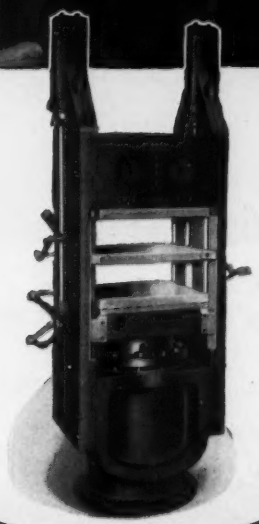

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IN one of the Rubber Industry's largest plants, these 10 Erie 300 Ton Hydraulic Presses are molding a multitude of rubber products. Each Erie press shown here has four 3 ton pushback cylinders. Main rams are ground from chilled iron. Pushdown rams are of stainless steel. All glands and guides are bronze. Each press has two 6 inch openings and 24 inch by 24 inch platens. Nearly a half-century of engineering "know how" in designing Erie Foundry Company hydraulic presses is matched by unexcelled craftsmanship in producing this equipment for the rubber and plastics industry. Let Erie Foundry Company Engineers consult with you on your hydraulic press problems. Bulletin 350 gives full details on Erie Foundry Company Hydraulic Presses. Write for it.

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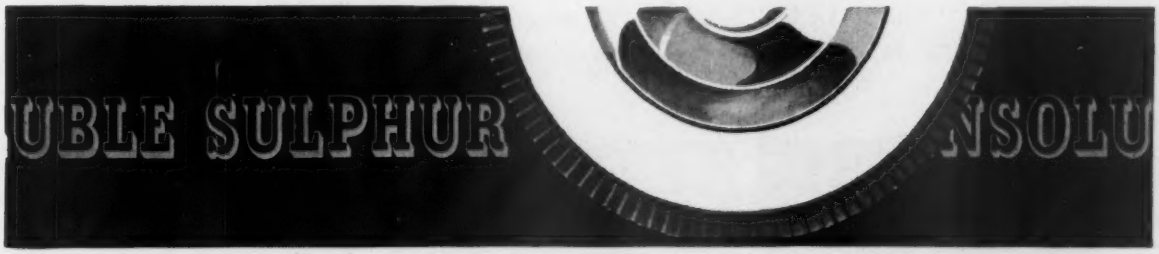

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No matter what type of latex products you make, there are opportunities for the silica chemistry of Du Pont "Ludox" to help you expand your markets.

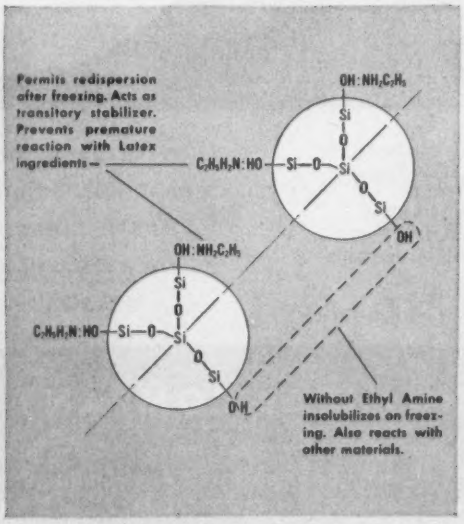
In latex-dipped goods, coatings and adhesives, "Ludox" colloidal silica increases stiffness, toughness and water resistance . . . decreases tackiness, improves adhesion. And this unique combination of properties is not found in any conventional latex additive. You will want to investigate all the advantages "Ludox" can give you by filling in and returning the coupon today.

"Ludox" is a 30% colloidal solution of almost pure amorphous silica particles. The electron photomicrograph shows fineness and uniformity of the "Ludox" particles—magnification, 175,000X. The average particle size of 17 millimicrons is below the range of the best carbon blacks.

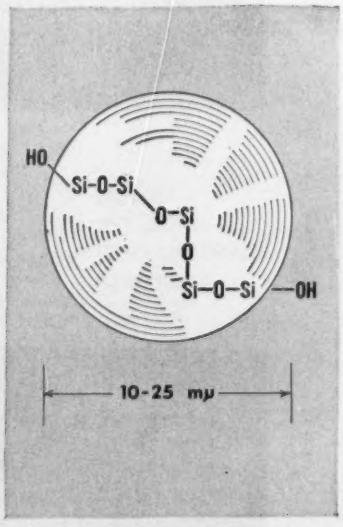
Surface hydroxyl groups on a "Ludox" micelle are shown in the diagram. These groups make the particles chemically reactive in contrast to commonly used dry fillers. This reactivity has led to many unusual properties and uses for "Ludox" in the latex field.

Typical "Ludox" reaction with ethyl amine is also shown below. This is useful in the stabilization of some latices containing "Ludox."

"Ludox" particles at 175,000 magnification.


Permits redispersion after freezing. Acts as transitory stabilizer. Prevents premature reaction with Latex ingredients
Without Ethyl Amine insolubilizes on freezing. Also reacts with other materials.

Reactions with and without monoethylamine.



Structure of "Ludox" particles showing surface hydroxyl groups.

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latex-dipped goods, coatings, adhesives

INCREASES STIFFNESS. Example: Seven parts of Du Pont "Ludox" colloidal silica solids per 100 parts neoprene latex produced a thread with nearly doubled modulus over the entire range of elongation. Similarly, increased modulus is obtained in natural rubber films.

INCREASES TOUGHNESS. Example: "Ludox" improved adhesion, stopped flaking from neoprene-coated belting. In a paper saturant, abrasion resistance was increased 20 to 40%.

IMPROVES ADHESION. Example: Doubled leather-to-leather adhesion by adding 20 parts of "Ludox" solids per hundred parts of natural rubber latex solids. This effect has also led to use in GRS and neoprene latex adhesives and coatings.

DECREASES TACKINESS. Example: Eliminated surface tack from uncured Buna N solvent coating on cloth. "Ludox" works equally well whether applied as an aftercoat or incorporated in the latex.

INCREASES WATER RESISTANCE. Example: Exceptional increase in water resistance or decrease in water swelling has been obtained with 20 parts "Ludox" solids per 100 parts neoprene latex solids.

DECREASES RUBBER SOLIDS. Example: In neoprene foam, 5 parts of "Ludox" solids per 100 parts of dry neoprene, Type 601, required about 20% less solids to obtain a given modulus than foam without "Ludox." A considerable saving without affecting flex life, bend flex or compression set.

Notice that "Ludox" gives combinations of properties that are difficult to achieve by any other method. And a little "Ludox" goes a long way.

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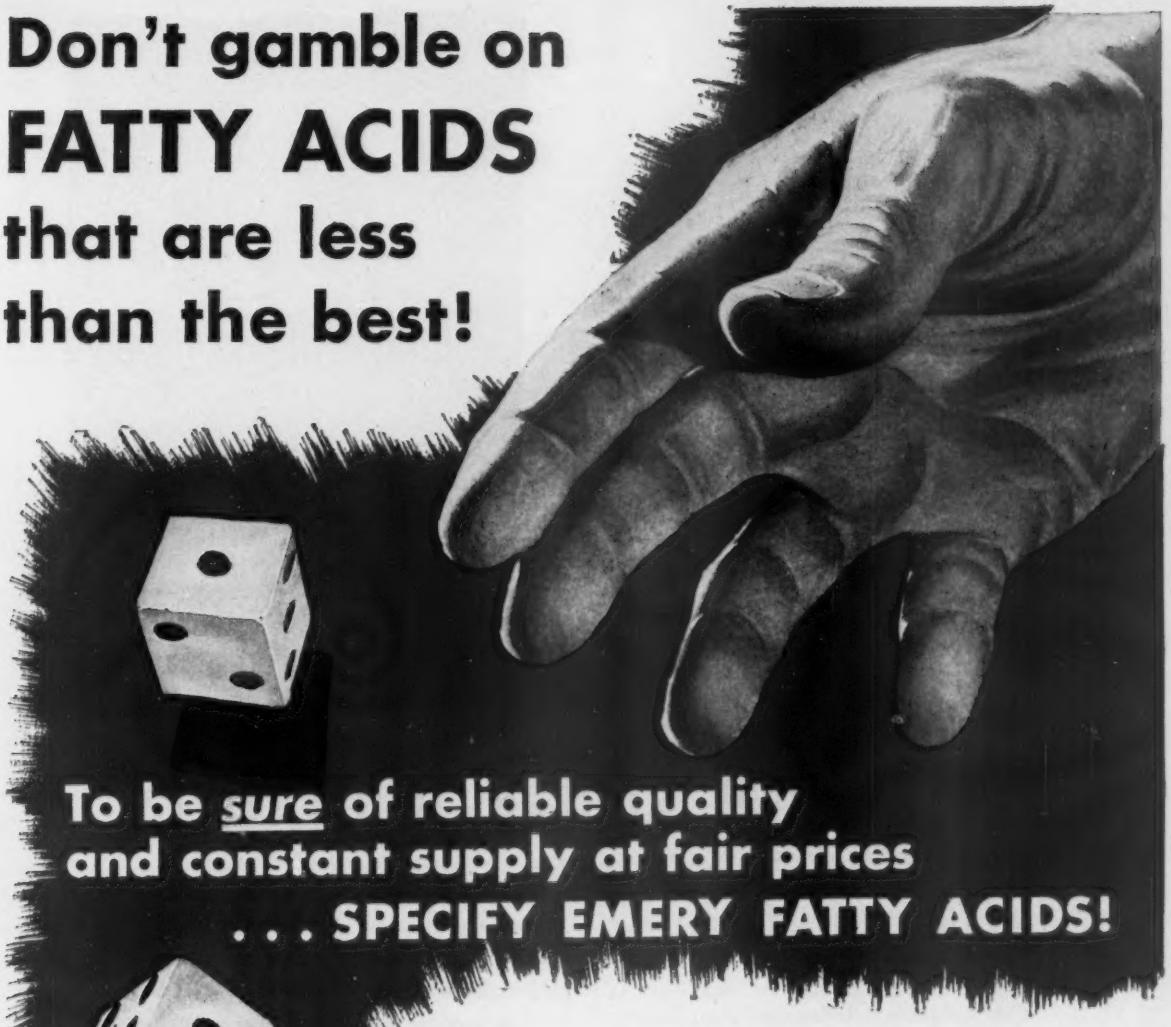

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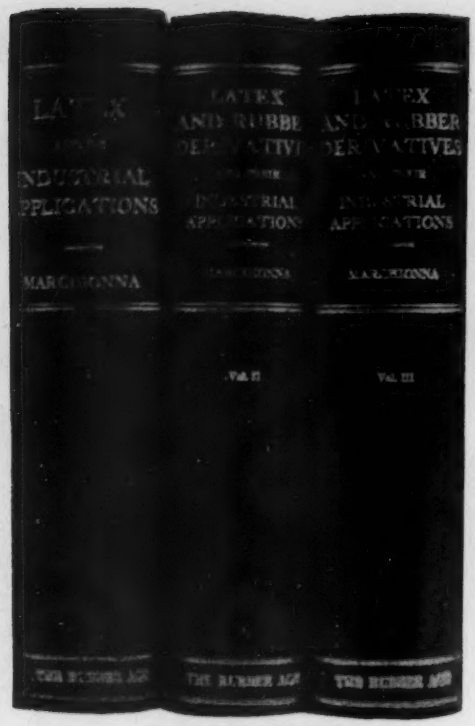

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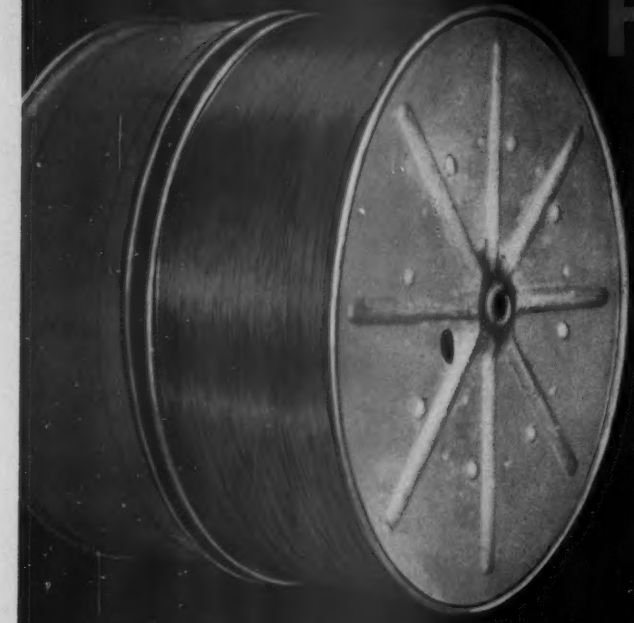

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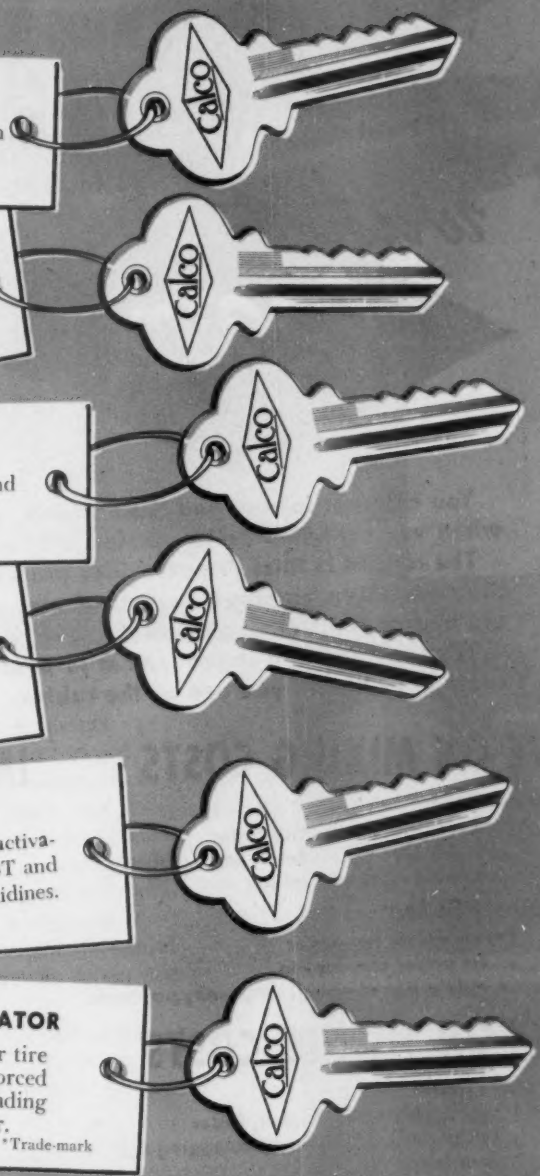

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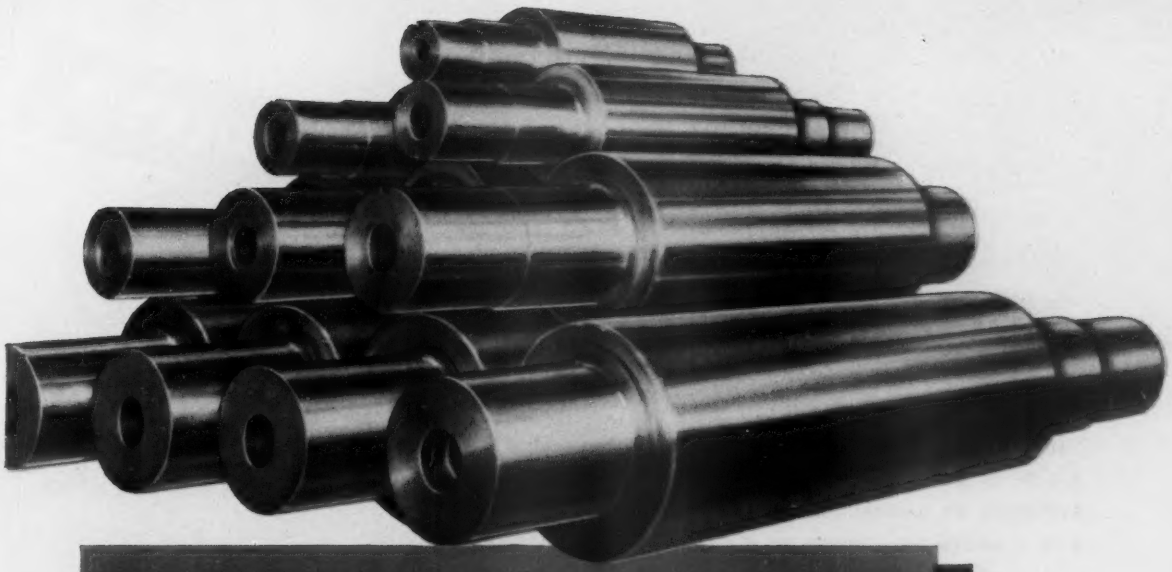

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Technical Bulletin

IDEAL FOR ALL STOCKS. Besides costing less than any of the five process aids it replaced, and its other advantages, Sundex-53 mixes easily with natural, GR-S and reclaim stocks. In the picture above it is shown being added to a batch of heel stock.

QUICKER, MORE THOROUGH PLASTICIZATION. By using Sundex-53 only, the company has been able to produce a more uniform finished product. Quality heels will be blanked out of the stock leaving this warm-up mill and entering the cutter.

SINGLE GRADE OF SUNDEX REPLACES 5 PROCESS AIDS

Some years ago, as an economy step, the Beebe Rubber Company, Nashua, N.H., tried to reduce the number of process aids it used. Five different types were being employed in the processing of natural, GR-S and reclaim stock for heels, soles and soling slabs.

A Sun representative who had been called in recommended replacing all five process aids with Sundex-53 and the company took his advice. This one "general purpose" rubber-process aid has more than just simplified inventories and purchasing; *it has proved advantageous in other respects besides.* Because of the way it is refined, it works as well with light colored stock as with dark. It quickly breaks down reclaims and does not overprocess natural rubber and GR-S polymers. It costs less than the process aids it replaced, and has eliminated the potential danger of mixing errors.

For more information about Sundex-53 and other Sun Rubber-Process Aids, write to us for the booklet "Processing Natural Rubber and Synthetic Polymers," offered in coupon below.

ECONOMIES ALL ALONG THE LINE. Sundex-53 not only costs less than any of the five products it replaced, but it also saves money through simplification of ordering and stocking. The operator shown above is setting up a mold to vulcanize heels.

SUN OIL COMPANY, DEPT. RA-2, Philadelphia 3, Pa.

I am having trouble that may be due to inadequate process aids. I should like to have: ☐ the services of a Sun representative; ☐ the booklet "Processing Natural Rubber and Synthetic Polymers."

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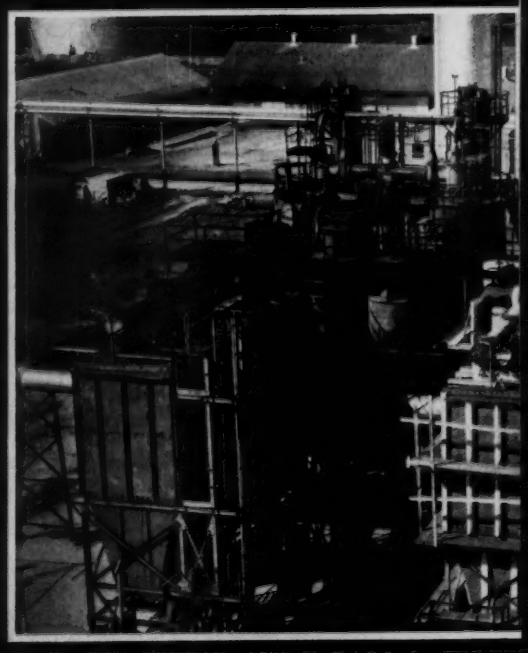

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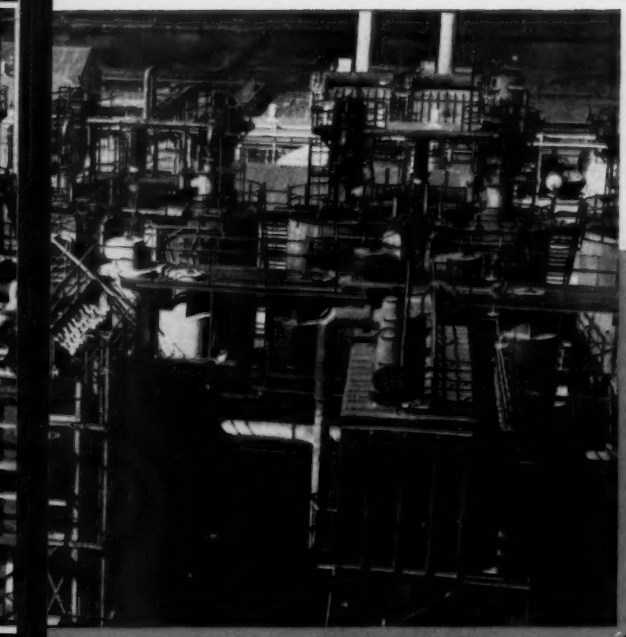

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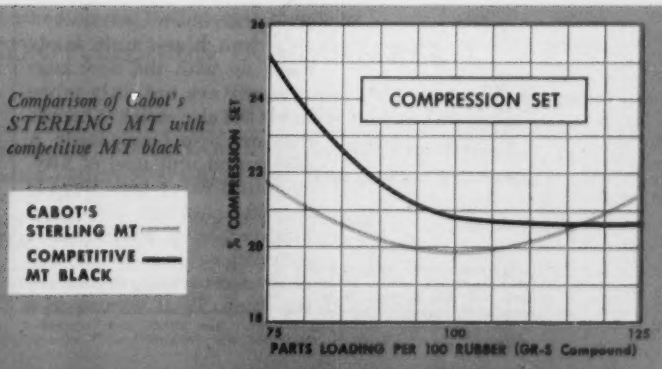

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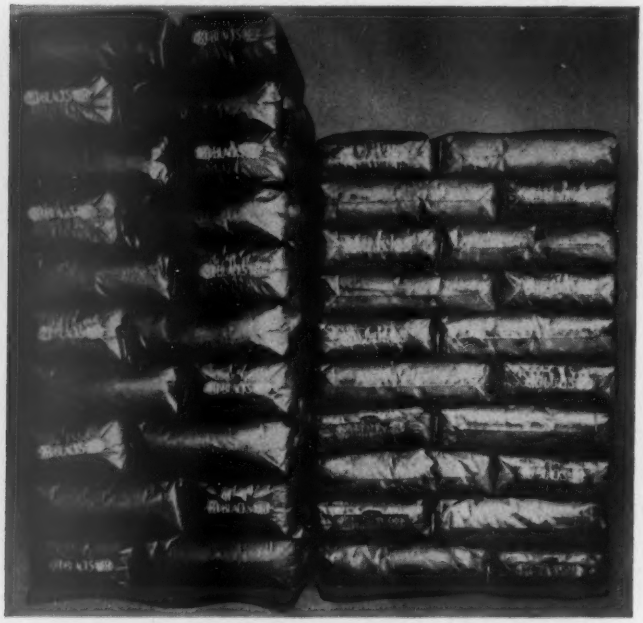

J. M. Huber Corporation Adopts New Valve-Type Bags for Unique Loads

New York, N. Y.—A new valve-type bag that gives more stable, more compact unit load shipments of carbon black, with a substantial saving in space, was announced today by J. M. Huber Corporation, 100 Park Ave., New York, manufacturers of carbon blacks, clays and rubber chemicals.

Carbon black unit loads made up with the new bags (above) are not only more stable but also easier to handle than similar old-style loads. A 2500-pound unit load of fifty, 50-pound valve-type bags is only 69 inches high in contrast to 84 inches for a unit load of conventional bags. Other load dimensions are approximately the same. Total volume of a new-style unit load is 95 cu. ft. contrasted to 108 cu. ft. The new bags also stack better.

There is an 18 percent saving in height with the new unit loads and overall volume saving of 12 percent. Whether the black is received in unit or loose bag loads, these savings still accrue. This means significant space saving in the customer's plant where the bags are stored for future use.

The new valve-type bags are currently available in carload and truckload shipments for all of Huber's channel blacks. Development work is in progress on a similar package for Huber furnace blacks.

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RUBBER AGE

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NUMBER 5

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RUBBER AGE

Vol. 72, No. 5 FEBRUARY, 1953

Use of the Banbury to Modify Properties of Synthetic Elastomers

By M. H. REICH and W. K. TAFT

Government Laboratories, University of Akron, Akron, Ohio

Typical results are shown where, by properly adjusting processing variables of different hot and cold GR-S types of synthetic rubbers, definite improvements in mill processing and extrusion properties can be obtained. By selecting the conditions of temperature and oxidation, the polymers can be broken down and/or gelled to affect the processing characteristics at varying degrees of sacrifice in the stress-strain properties. In Banbury treatment by properly adjusting loading, rotor speed and time of mastication, the temperature and thus the amount of breakdown or cross-linking can be influenced. Under some conditions, additional air may be needed to meet the end requirements of the particular polymer involved. Typical examples have been cited. It is thought that these principles can probably be applied to equipment other than the Banbury.

IN COMPOUNDING butadiene-styrene elastomers it is desirable at times to utilize a polymer with excellent physical properties and a minimum of processibility, whereas other occasions demand one with optimum processing but meeting less severe physical standards. A third requirement is for the best balance of the two properties. In this paper processibility is defined as mill processing and extruding properties, but not ease of breakdown in a Banbury. Compounded Mooney viscosity and scorchiness are also not included in the term processibility as used here.

By means of Banbury treatment, GR-S polymers can be processed to alter considerably the processing and physical properties. Variation of the Banbury loading and/or rotor speed can be utilized to change the properties of GR-S made at 41° or 122°F. to obtain the desired balance of processing and physical characteristics. Each polymer may require different variations to achieve the same result, if possible, and under certain conditions more breakdown of polymer structure may require the use of forced air.

This paper is presented with the hope that certain principles can be shown which are generally applicable, so that users of GR-S may, by studying the particular polymer they are using, arrive at the optimum conditions for their particular problem.

PROCEDURE

The raw stocks were charged into a laboratory Banbury (size B) at various loadings of polymer and masticated for various times up to 20 minutes. The rotor speeds were 80 r.p.m. for the front and 88 r.p.m. for the back rotor, or some ratio of these speeds as shown. The ram pressure was 80 to 85 pounds per square inch. Cooling water was circulated through the jacket and rotors of the Banbury to adjust the initial temperature of the chamber to 90° to 100°F. and was also circulated throughout each run. Dump temperatures of the stocks were measured with a needle pyrometer. When used, air from cylinders was introduced at both sides of the

TABLE I—BANBURY DATA FOR HIGH TEMPERATURE POLYMERS

BB Loading (g.)	BB Time (min.)	Viscosity (ML-4)	Dump Temp. (° F.)	Gel (%)	S.I.	DSV
			GR-S-65-SP			
None	None	55	——	28	——	2.16
1200	10	43	270	3	——	2.21
1400	10	39	325	3	——	2.11
	20	34	310	3	——	1.70
1475	10	36	390	21	——	1.43
1500	10	36	460	45	——	1.07
1525	10	38	435	41	——	1.21
			X-603 GR-S			
None	None	54	——	4	——	2.15
1400	5	36	300	Nil	——	2.02
	10	29	300	20	102	1.41
1450	5	36	320	17	137	1.59
	10	28	340	34	58	1.20
1475	5	36	360	16	135	1.59
	10	29	360	36	45	1.10
1500	5	36	360	22	91	1.43
	10	30	380	34	40	1.06
1525	5	35	360	25	82	1.48
	10	27	380	34	40	1.07
1550	5	38	370	19	95	1.63
	10	28	390	38	37	0.98

mixing chamber at a pressure of approximately 250 pounds per square inch. Various flow rates were utilized, but the temperature of the entering air was constant at about 80°, or 165°F.

Mooney viscosity, gel, and dilute solution viscosity (DSV) of the masticated stocks were determined before and after breakdown. The following recipes were employed for compounding the polymers:

Ingredients	Parts	
GR-S-65-SP [a] or X-603 GR-S [a]	100.0	——
X-624 [b] or X-565-SP [c]	——	100.0
EPC (Wyex) black	40.0	40.0
Zinc oxide	5.0	5.0
Sulfur	2.0	2.0
Altax (benzothiazyl disulfide)	1.75	3.0
Stearic acid	——	1.5

(a) 71/29 butadiene-styrene copolymer made at about 120° F.
(b) 75/25 butadiene-styrene copolymer made at about 41° F.
(c) 71/29 butadiene-styrene copolymer made at about 41° F.

The compounded Mooney viscosity, length of time required to break down the polymer on the mill, shrinkage and roughness of subsequently milled samples, and extrusion through a Garvey die by means of a No. ½ Royle extruder were measured. The extruded specimen was rated according to the method of Garvey, Whitlock, and Freese *(2)*. The stress-strain tests were conducted at 77°F. on specimens (A.S.T.M. dumbbell strips, 0.075-inch thick) that had been cured at 292°F. as described in the Synthetic Rubber Division Specifications *(1)*. Strain tests were conducted at 77°F. by the method outlined by Roth and Stiehler *(4)*; the value of t_p was calculated as previously suggested by Schade *(5)*.

GENERAL DISCUSSION

The effects of variations in the Banbury loading and/or in the rotor speed or in the amount of air flow during treatment to modify the physical properties of standard GR-S polymers made at 122° and 41°F., respectively, are discussed in the ensuing sections.

Banbury Breakdown of High Temperature Polymers

GR-S-65-SP: When polymer GR-S-65-SP was masticated for a period of 10 minutes in a laboratory Banbury at a loading of 1400 grams, the viscosity of the polymer was decreased from 55 to 39 ML-4 and the gel from 28 to 3% (Table I). Reduction of the loading to 1200 grams also yielded an essentially gel-free polymer with a viscosity of 43 ML-4. However, an increase in the loading to 1475 grams increased the rate of Mooney viscosity breakdown slightly but yielded a polymer having a gel content of 21%. Further increases in the loading to 1500 or 1525 grams caused the polymer to process at higher temperatures, about 450°F., and to form more gel, yet did not influence the rate of Mooney viscosity breakdown.

X-603 GR-S: Breakdown of X-603 GR-S was not materially changed by a stepwise increase in the Banbury loading from 1400 to 1550 grams of polymer with 5 or 10 minutes of mastication (Table I). Generally, about 16 to 25% gel formed during the 5-minute Banbury mastication of X-603 at loadings of 1450 to 1550 grams in 25-gram increments, but the swelling indices (S.I.) decreased from about 140 to 80, indicating a relatively loose type of gel. Increasing the time of mastication for X-603 to 10 minutes at these same loadings, resulted in stocks of 34 to 38% gel and S.I. values decreasing from 58 to 37.

Processing and Stress-Strain Properties of High Temperature Polymers

GR-S-65-SP: Breakdown of GR-S-65-SP at a loading of 1400 or 1475 grams lowered the mill shrinkage and roughness values slightly and aided the extrudibility (Table II) and increased the modulus, but did not affect the tensile properties to any noticeable extent (Table III). However, the plastication, achieved at the higher temperatures with higher loadings of 1500 and 1525 grams, increased the gel content of the polymer, and markedly improved both the mill processing and extru-

TABLE II—MILL PROCESSING AND EXTRUSION PROPERTIES FOR THE HIGH TEMPERATURE POLYMERS

BB Loading (g.)	BB Time (min.)	Viscosity (ML-4) Raw	Viscosity (ML-4) Compd.	Mill Breakdown Time (min.)	Mill Shrinkage (%)	Roughness	Extrusion Index
			GR-S-65-SP				
None	None	55	71	2	57	36	7.0
1400	20	34	69	1	50	27	8.5
1475	10	36	74	1	48	23	8.5
1500	10	36	82	1	25	7	15.0
1525	10	38	78	1	30	15	14.0
			X-603 GR-S				
None	None	54	62	3	49	18	7.0
1400	5	36	61	1	55	17	9.0
	10	29	59	1	55	16	9.0
1450	5	36	60	1	45	12	8.5
	10	28	59	1	40	14	9.5
1475	5	36	57	1	46	13	8.5
	10	30	62	1	43	20	9.5
1500	5	36	63	1	48	20	8.0
	10	30	67	1	38	10	9.5
1525	5	35	60	2	58	15	10.5
	10	27	64	2	50	10	10.5
1550	5	38	61	1	45	36	9.0
	10	28	67	1	39	13	9.5

sion properties. Thus, the extrusion index was increased from 7 to values of 15 and 14 (better), the roughness was decreased from 36 to 7 and 15, and the mill shrinkage from values of 57% to 25% and 30%. On the other hand, the maximum tensile strength was decreased from 3010 to about 2650 pounds per square inch.

X-603 GR-S: Banbury treatment of X-603 for 5 minutes at loadings of 1400 to 1550 grams did not affect the mill processing properties (Table II) or the maximum tensile strength (Table III) to any noticeable extent. Although the extrusion index was improved by Banbury mastication, the amount of the loading did not markedly affect this property; the value at 1525 grams of polymer was the highest. Consistent with the increase in gel and the decrease in swelling index (Table I), additional plastication at loadings of 1450 to 1550 grams generally lowered somewhat the mill shrinkage, changed the extrusion index to a slight extent (Table II), lowered the cure index (inverse measure of scorch) a few minutes, and raised the compounded viscosity and modulus (Table III). Again the extrusion value at the 1525-gram loading was higher than that of the others. The average decrease in maximum tensile strength for X-603 stocks masticated for 10 minutes was slightly greater than that for stocks treated for 5 minutes, correlating with changes in the gel and S.I. data.

The extrusion properties of polymer GR-S-65-SP were improved by raising the Banbury loading to 1500 grams, although the maximum tensile strength deteriorated, whereas no significant change in the extrusion or stress-strain properties of X-603 was observed when the Banbury loading was increased from 1400 to 1550 grams. Thus, different high temperature polymers will react differently to variations in Banbury conditions.

Banbury Breakdown of Low Temperature Polymers

X-565-SP: Treatment of this polymer (Table IV) at a loading of 1475 grams for 10 minutes and a rotor speed of 80 r.p.m. caused excessive temperatures and a marked stiffening of the elastomer, as judged by large increases in both the ML-4 viscosity and gel content of the polymer. At a loading of 1400 grams, lower temperatures resulted and mastication of the polymer for 5 minutes increased the viscosity and gel to 62 ML-4 and 15%; further mastication at increasing temperatures for a total of 10 minutes increased only the gel to 48%, whereas another increase of 10 minutes with continued temperature rise increased both the viscosity and gel.

Breakdown of the polymer without formation of gel was accomplished at a lower temperature by reduction in the loading to 1200 grams; the viscosity was decreased to 52 ML-4 in 10 minutes and to 40 ML-4 in 20 minutes. Since this rate of softening was considered to be low compared to that for polymers made at 122°F., an attempt was made to increase the breakdown rate by raising the rotor speed from 80 to 120 r.p.m. However, the viscosity of the polymer increased slightly and a considerable amount of gel formed. Lowering the loading stepwise from 1200 to 800 grams at the higher rotor speed resulted in lower dump temperatures and yielded a maximum rate of breakdown (41 ML-4 viscosity in 10 minutes at a loading of 900 grams) without formation of gel. The dependence of the plasticated viscosity of the treated polymer on dump temperature, loading, and rotor speed is shown in Figure 1.

This procedure might be utilized in conjunction with the compounding of the polymer, i.e., the polymer may be softened at a loading normally employed for compounding by increasing the rotor speed. When the desired degree of breakdown is obtained, the rotor speed might be reduced to the normal speed and the compounding ingredients added in the Banbury.

To achieve breakdown of the low temperature polymer at a high Banbury loading (1475 grams), air at approximately 165°F. was introduced into the chamber and caused plastication of the polymer to 39 ML-4 viscosity in 3 minutes and to 30 ML-4 in 6 minutes without formation of gel.

Thus, the amount of Banbury loading and/or rotor speed can be utilized to vary the temperature to accomplish breakdown of 41°F. polymer without formation of gel or to produce a gelled polymer of the same or higher viscosity. Breakdown of this type polymer at high loadings can be accomplished by the introduction of air into the chamber for a relatively short period.

TABLE III—STRESS-STRAIN PROPERTIES FOR BANBURY-TREATED HIGH TEMPERATURE POLYMERS

BB Loading (g.)	BB Time (min.)	t_p (min.)	Cure Index [a] (min.)	300% Modulus (lb./sq. in.)		Tensile Strength (lb./sq. in.)	
Min. cured at 292° F.:				25	75	50	[b]
			GR-S-65-SP				
None	None	—	—	530	1110	2680	3010
1400	20	—	—	700	1330	2610	2960
1475	10	—	—	670	1420	2330	2820
1500	10	—	—	990	1870	2450	2640
1525	10	—	—	820	1640	2470	2650
			X-603 GR-S				
None	—	43	48	610	1550	3010	3130
1400	5	41	45	550	1620	2900	3000
	10	45	51	520	1600	2750	3000
1450	5	44	47	530	1720	2910	3130
	10	44	47	570	1770	2570	2620
1475	5	46	48	540	1680	2600	2950
	10	44	45	610	1760	2550	2930
1500	5	46	48	550	1770	2860	3280
	10	45	44	620	1890	2670	2980
1525	5	44	48	610	1670	2750	2970
	10	43	42	610	1830	2610	2980
1550	5	44	51	540	1630	2880	3170
	10	42	46	740	1880	2940	3060

(a) Determined from Mooney data at 300° F.; cure index = 6 (cure point-scorch point) + scorch point. (b) Maximum tensile value.

TABLE IV—BREAKDOWN DATA FOR X-565-SP

(58 ML-4; 1% Gel; 2.17 DSV)

Run No.	BB Loading (g.)	BB Time (min.)	Dump Temp. (° F.)	Visc. (ML-4)	Gel (%)	DSV
R13	800	10 [a]	260	47	4	1.80
R12	900	10 [a]	280	41	3	1.94
R11	1000	10 [a]	280	44	1	1.97
R10	1100	10 [a]	300	50	11	1.84
R9	1200	10 [a]	320	61	36	1.26
R4	1200	10	260	52	2	2.11
R8	1200	20	265	40	1	1.94
R5	1400	5	330	62	15	1.82
R6	1400	10	360	62	48	1.04
R7	1400	20	410	69	64	0.89
R3	1475	10	490	101	64	0.78
			Added air [b]; 6 cu. ft./min.			
R2	1475	3	280	39	1	1.86
R1	1475	6	280	30	4	1.68

(a) Rotor speed was 120 r.p.m., as compared to 80 r.p.m. for all other runs. (b) At 160° F.

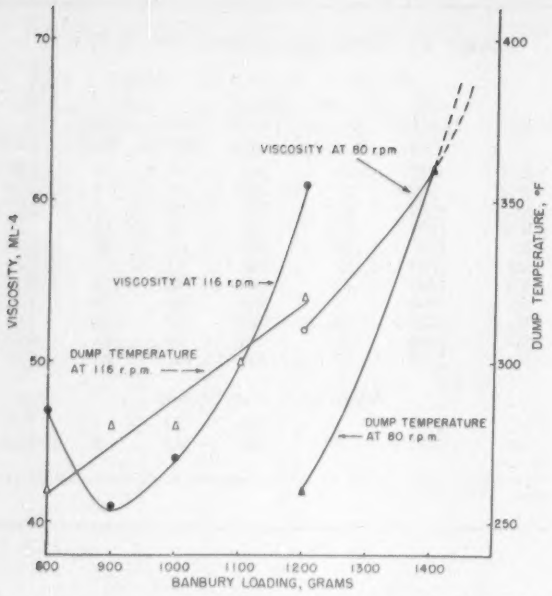

FIG. 1—Banbury treatment of polymer X-565-SP for 10 minutes.

X-624: To determine whether polymers made at 41°F. can be softened while at the same time they are forming gel in a manner similar to that for polymers made at 122°F., the amount of air entering the Banbury was varied from 0 to 12.4 cu. ft./min.

Introduction of large amounts of air (7.2 to 12.4 cu. ft./min.) into the Banbury during the mastication of X-624 polymer (Figure 2) at a 1475-gram loading caused the dump temperature to decrease markedly and the elastomer to soften to a viscosity of approximately 40 ML-4 in 10 minutes without formation of gel. Reduction of the air flow to 4.4 cu. ft./min. during the same period of mastication yielded gel-free polymer of 31 ML-4; this polymer was discharged from the Banbury at a temperature of 300°F. (see Figure 2). With additional decreases in the quantity of air from 4.4 to 2.2 and 0.9 cu. ft./min., the dump temperature increased and the rates of plastication were progressively reduced and increasing amounts of gel formed in the polymer. At a flow rate of 0.9 cu. ft./min. polymer of 40 ML-4 viscosity and 36% gel resulted. When excess air was not introduced into the Banbury during treatment, the temperature of the polymer was excessive and the polymer stiffened to a viscosity of 85 ML-4 and a gel of 57%.

Apparently the addition of small amounts of air is a means of obtaining low temperature polymers of low viscosity and of a controlled amount of gel. However, as noted in previous work *(6)*, to match the type of breakdown of a given standard polymer each low-temperature polymer may require more or less air. Thus, different antioxidants or shortstopping agents may adversely affect the rate of breakdown, thereby increasing the air requirements and/or the Banbury loading needed for maximum breakdown with or without gel formation.

In both studies, namely, adjustment of the Banbury loading for high temperature polymers or regulation of the air flow during Banbury mastication of low-temperature elastomers, when the condition for maximum breakdown was ascertained, it was possible to produce polymer of low viscosity but containing gel, essentially by conducting the mastication at higher effective volumes of polymer. Thus, for high temperature rubbers, the loading was increased to reduce the air volume, and for low temperature polymers the amount of added air was lowered. These changes yielded higher Banbury processing temperatures which promote gel formation.

Thus, both low and high temperature polymers can be softened in the Banbury with or without the formation of gel.

Processing and Stress-Strain Properties of Low Temperature Polymers

X-565-SP: Mastication of the polymer at high loadings (1475 and 1400 grams) caused relatively high dump temperatures and treatment at these conditions for 10 and 20 minutes, respectively, increased noticeably the compounded viscosity to >175 ML-4, lowered the mill shrinkage and roughness, and improved the extrudibility (index of about 9), but deteriorated the stress-strain properties (tensile of about 2600 pounds per square inch, Table V). The mill processing, extrusion, and stress-strain properties of the polymers with less gel (masticated at a 1400-gram loading, Table IV) were not determined.

Breakdown of this cold rubber to about 40 ML-4 at low loadings without added air or at high loadings with added air at about 6 cu. ft./min. was accomplished at low temperatures (below 300°F.) and decreased the

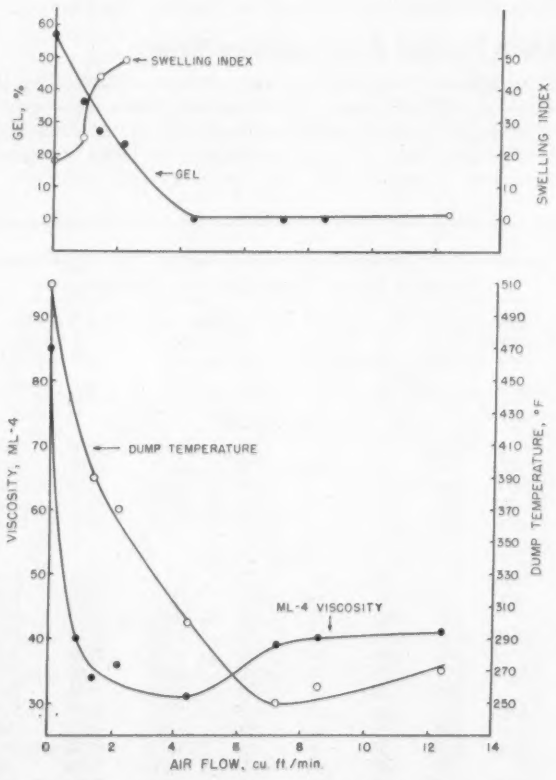

FIG. 2—Effect of flow rate of added air on Banbury properties of low temperature elastomers. (10-minute treatment of 1475 grams of X-624 at 80 r.p.m.).

TABLE V—PROCESSING AND STRESS-STRAIN PROPERTIES FOR POLYMER X-565-SP

Run No.	BB Loading (g.)	BB Time (min.)	Viscosity (ML-4) Raw	Viscosity (ML-4) Compd.	Mill Breakdown Time (min.)	Mill Shrinkage (%)	Roughness	Extrusion Index	300% Modulus (lb./sq. in.) 25	300% Modulus (lb./sq. in.) 75	Tensile Strength (lb./sq. in.) 50	Tensile Strength (lb./sq. in.) 75
Min. cured at 292° F.:												
X-565-SP	None	—	58	75	2	37	59	7	490	1300	3810	3810
R3	1475	10	101	>175	8.5	21	35	8.5	850 [a]	1580 [a]	2590	2700
R7	1400	20	69	>175	1	29	12	9	1030 [a]	1950 [a]	2560	2560
R8	1200	20	40	67	1	38	59	7	630	1500	3860	3960
R10	1100	10 [b]	50	75	1	42	66	6	800	1770	3450	3820
R11	1000	10 [b]	44	67	1	—	43	—	590	1560	3820	3700
R2 [c]	1475	3	39	65	1	37	38	7	600	1430	3810	4090

(a) 200% modulus. (b) Rotor speed was 120 r.p.m., as compared to 80 r.p.m. for all other runs. (c) Air added at 6 cu. ft. per minute.

compounded viscosity, but did not affect the other processing properties or the tensile strength to any substantial extent. At low temperatures, gel is not formed; the raw Mooney but not the compounded Mooney viscosity is reduced, and little or no improvement in processing is accomplished, without degradation of the stress-strain properties. To improve the roughness, mill shrinkage and the extrusion index somewhat, conditions to give high temperature, high gel, high raw and compounded viscosities are needed, but a degradation in stress-strain properties and increase in scorchiness as shown by the high compounded Mooney viscosities occur.

X-624: To show in detail how the dump temperature can be varied and the effect of this variation on the processing and stress-strain properties, X-624 was broken down with added room temperature air.

Flow rates of from 7.2 to 12.4 cu. ft./min. changed the compounded viscosity, extrusion, and cure indices very little (Figure 3) and had no effect upon the mill shrinkage and roughness. The compounded viscosity of the stock prepared from X-624 which had been softened by less air treatment to 31 ML-4 (Figure 2) was lower than the compounded viscosities of the other stocks prepared from air-treated X-624. Formation of 25% gel in the softened polymers of 35 ML-4 (at air flows of 1.4 and 2.2 cu. ft./min.—see Figure 2) resulted in stocks of compounded viscosities slightly higher and with much better extrudibility (Figure 3) than those plasticated with larger amounts of air. A further increase in the gel content of the air-treated polymer of 40 ML-4 viscosity to 36%, by lowering the air flow to 0.9 cu. ft./min. and increasing the dump temperature (Figure 2), did not improve the processing properties to any marked extent and the compounded viscosity increased to 77 ML-4 (Figure 3). This stock also displayed a greater tendency to scorch (lower cure index) than did the others (Figure 3). Thus, by decreasing the air flow into the Banbury below 4.4 cu. ft./min., the dump temperatures were increased and the extrudibility of the resulting samples improved, but without any air flow the extrudibility was rather poor.

Use of 4.4 to 12.4 cu. ft./min. of air did not harm the stress-strain characteristics of X-624 (Table VI) compared with the mill-mixed stock. Reduction of the air

TABLE VI—STRESS-STRAIN RESULTS FOR AIR-BANBURY-TREATED X-624 STOCKS

Air Flow (cu.ft./min.)	t_p (min.)	Cure Index [a] (min.)	300% Modulus (lb./sq. in.) 25	300% Modulus (lb./sq. in.) 75	Tensile Strength (lb./sq. in.) 50	Tensile Strength (lb./sq. in.) [b]
Min. cured at 292° F.:						
None	39	43	900	2200	2920	2870
0.9	46	48	760	2000	3280	3540
1.4	46	54	610	1710	3240	3630
2.2	46	55	600	1750	3200	3510
4.4	53	60	360	1220	3640	4020
7.2	52	54	430	1300	3830	4260
8.5	53	59	420	1300	3840	4050
12.4	50	57	450	1310	3880	4170
—— [c]	51	57	400	1200	3960	4170

(a) Determined from Mooney data at 300° F.; cure index = 6 (cure point — scorch point) + scorch point. (b) Maximum tensile value. (c) Mill-mixed stock which was not previously treated in the Banbury.

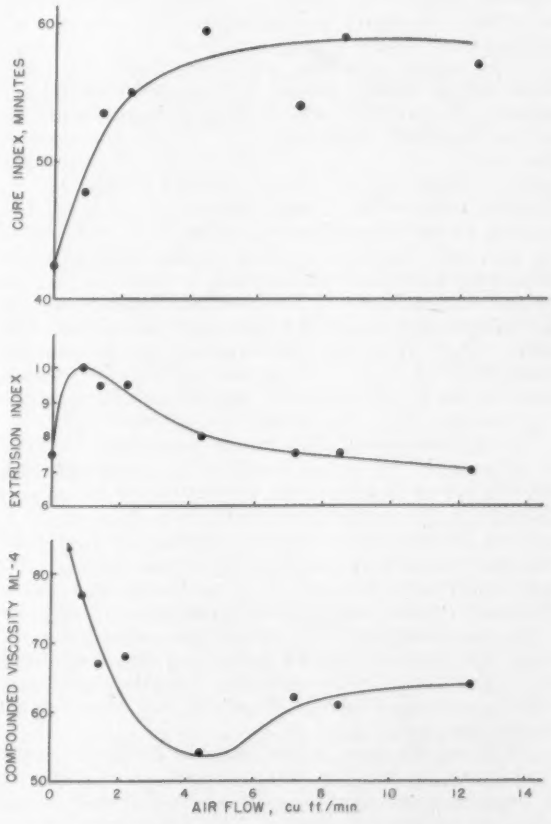

FIG. 3—Effect of flow rate of added air on various properties of Banbury-treated X-624.

flow to 2.2 to 0.9 cu. ft./min. caused deterioration of the maximum tensile strength to about 3500 pounds per square inch, raised the level of cure, as evidenced by the higher modulus values, and also increased the rate of cure as indicated by lower t_p values.

Stock prepared from X-624 masticated in the absence of air had an extremely high compounded viscosity, low mill shrinkage, relatively high roughness, poorer extrudibility, and poorer scorching characteristics than those of the stocks masticated with air at flow rates of 1.4 or 2.2 cu. ft./min.

Thus, it is apparent from the typical data that are presented that by adjusting the temperature of breakdown in a Banbury by varying the loading and oxidizing conditions, the viscosity breakdown and the gel and molecular structure of the raw polymer can be influenced. Choice of the conditions can affect markedly the compounded viscosity, the processing and stress-strain properties. It is thought that these principles can be applied to equipment other than the Banbury.

SPECIAL NOTE

The work reported in this paper was carried out under the sponsorship of the Office of Synthetic Rubber, Reconstruction Finance Corporation, in connection with the government synthetic rubber program.

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Impregnation of Leather with Butyl Rubber

THE process for impregnation of leather with natural rubber, which the U. S. National Bureau of Standards developed in 1949, has recently been extended to permit the use of polyisobutylene as an impregnant. Soles impregnated with this butyl polymer have the same greatly improved abrasion and water resistance as those containing rubber. However, polyisobutylene has a distinct advantage over rubber as an impregnant in that it eliminates the milling operation required to reduce the molecular size of natural rubber sufficiently to allow deep penetration. It also results in large savings of time, labor, and materials in the tannery. The butyl-impregnation process was developed by René Oehler, Sverre Dahl, and T. J. Kilduff of the NBS leather laboratory.

Impregnation with the butyl compound merely requires soaking of the naturally porous leather in a solution of the polymer. The impregnating solution is prepared by dissolving polyisobutylene, having a molecular weight range between 50,000 and 100,000, in common solvents such as gasoline, kerosene, benzene, or chloroform. The leather is air-dried and immersed in the solution for about three hours. It is then removed from the solution, the excess solvent is wiped off, and the remaining solvent is evaporated from the leather.

If vegetable-tanned crust leather is used and the grain or hair side of the leather is split off to a depth of about 40 mils before impregnation, penetration by the polyisobutylene is more rapid and uniform. This results in greater abrasion resistance, and the top grain split becomes a valuable by-product for use in luggage, upholstery, bookbinding, and other fine-leather applications. Because vegetable-tanned crust leather requires less tanning and processing than commercial sole leather, the butyl-impregnation process makes possible considerable savings not only in time and labor but also in expensive tanning materials, which at present are almost exclusively imported.

NBS studies have shown that the butyl polymer is well suited for treating shoe soles and upper leather, as it reduces water absorption by about half and doubles abrasion resistance. Service tests were carried out in which the same individual wore one sole of butyl-treated vegetable-tanned crust leather mated with a control sole of untreated leather obtained from the same part of the animal, and finished as commercial sole leather. Crossmating of these matched soles eliminated any bias due to differences between right and left feet of the test personnel. Of the 12 pairs of soles tested, the control sole wore through before the butyl-impregnated sole in every case. The tests showed that the treatment increases wear by about 80 percent.

Research in materials and techniques for leather impregnation is continuing at the National Bureau of Standards in Washington, D. C. The Bureau is also carrying on pilot-plant studies of butyl-impregnation processes under the sponsorship of the Department of the Navy.

(EDITOR'S NOTE: For further details on the use of polyisobutylene as an impregnant for leather the reader is referred to the article on "Treatment of Leather with Polyisobutylene," by Messrs. Oehler, Dahl and Kilduff, which appeared in the *Journal of the American Leather Chemists' Association*, Vol 47, p. 642, 1952).

Letter to the Editor

Dear Sir:

I notice in your August, 1952, issue one of those periodic warnings about the costliness of steam leaks. Pardon me for injecting: Any one entrusted with a boiler operating at 305 psi gage should not tolerate leaks.

Assuming the $6.00 coal to be an average bituminous purchased close enough to the mine so that the freight rate would not bring the delivered price above that figure, any one requiring a pound of coal to raise six pounds of steam should not be permitted to buy any coal. It is too flagrant a waste of natural resources to operate an industrial boiler at less than 50% efficiency.

I trust you don't mind my bluntness.

Yours,

PAUL LUPKE, JR.

Essex Rubber Co.
Trenton, N. J.

A Study of the Oxidation of Rubber by Means of the Isotopic Method

By A. D. KIRSHENBAUM and A. G. STRENG
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and A. H. NELLEN
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WHEN studying the oxidation of rubber by mastication, oxygen, or ozone, it is necessary to know its physical properties and oxygen content at various stages of oxidation. In the past, oxygen has been determined in rubber, as in other organic compounds, by difference *(7)*. This method, however, was time-consuming and subject to cumulative errors. Only in the last twenty-five years have serious attempts been made to develop a direct analytical method.

The first successful attempt was made in 1922 by H. ter Meulen *(9)* who catalytically hydrogenated the oxygen of the organic materials to water. In 1939 Cramer, Sjothun and Oneacre *(2)* applied this method to rubber. It has the disadvantage of most catalytic methods, in that it requires careful and accurate control and purity of the catalyst. A somewhat more convenient method was developed by Schütze *(8)* and later improved by Unterzaucher *(10)*. The Schütze-Unterzaucher method is based on the decomposition of the organic compound in a stream of pure nitrogen over pure carbon at a temperature of 1120° C. All the oxygen of the organic compound is assumed to appear as carbon monoxide. Chambers *(1)* and Walton *(11)* used this method to determine the oxygen content of rubber.

All the above-mentioned methods require quantitative separation and quantitative recovery of the oxygen-containing compound or of its reaction products. A comprehensive review by Elving and Ligett *(3)* summarizes these methods of analyzing for oxygen in organic compounds.

A previous paper by the authors *(6)* showed that the Unterzaucher method of analysis obtained low oxygen values when used on rubber, while excellent results were obtained when using the Isotopic Method in analyzing rubber for its oxygen content. The Isotopic Method was developed by Grosse, Hindin and Kirshenbaum *(4)* in 1946 to determine the oxygen content of organic compounds. This method has the fundamental advantage that quantitative results are obtained without any quantitative separation of any oxygen or oxygen-containing compounds.

PRINCIPLE OF THE ISOTOPIC METHOD AND ANALYTICAL FORMULA

The principle of the Isotopic Method is an adaptation of the isotopic dilution principle originally introduced by v. Hevesy and Paneth *(5)*. The sample, together with a known amount of heavy oxygen (O^{18}), is heated in a platinum tube to the point of decomposition (800-900° C.) for 30 to 60 minutes. At this temperature all the oxygen atoms, in any of the oxygen compounds present, exchange statistically, the ratio of the oxygen isotopes in the various oxygen-containing compounds present (CO_2, CO, H_2O and oxygen in residue) becoming identical.

The ratio, O^{18}/O^{16}, can be determined with a high degree of precision by means of modern isotopic mass spectrometers. Only an aliquot sample of the equilibrium mixture need be taken for mass analysis; usually a fraction of a cc. is sufficient. Knowing the ratio it is easy to calculate the original oxygen content from the simple mixture rule, namely,

$$x\% = \frac{b\,(m-n)}{a \cdot n} \cdot 100$$

In this equation, a is the known weight of the sample, containing x weight % of the oxygen to be analyzed, and is equilibrated with a known weight, b, of O^{18} labeled oxygen containing m atom % of O^{18} in excess of the normal isotopic concentration (~0.21%) where n atom % is the excess O^{18} concentration after equilibration. The exact normal isotopic concentration is determined before each analysis.

The precision of the Isotopic Method is independent of the oxygen concentration in the compound. If small quantities of oxygen are expected, the amount of O^{18} added to the sample can be adjusted accordingly. Thus, results of high precision may be obtained even if traces of oxygen are present. The method is described in detail in a previous publication *(4)*.

Apparatus

The apparatus used to determine the oxygen content of rubber is shown in Figure 1. The reaction vessel (A) is an 80 ml. platinum tube connected by means of a Hoke needle valve, copper flared fittings and a glass-to-copper seal to the glass vacuum system. The pyrex glass system is made of 2 mm. i.d. capillary tubing while the U trap (E) is made of 5 mm. o.d. tubing. Vacuum stopcocks are used throughout the system. The rest of the glass system consists of a Toepler pump (F), 3 mm. o.d. pyrex gas sampling tubes (G), a manometer (H), a McLeod gauge (I), an oxygen-18 storage bulb (O) and two gas burettes (C). One burette, having a volume of 10 ml., is graduated to the nearest 0.02 ml. and read to the nearest 0.005 ml., while the second, having a volume of 5 ml., is graduated to 0.01 ml. and read to the nearest 0.002 ml.

Note: This paper was presented before the Division of Rubber Chemistry, American Chemical Society, Cincinnati, Ohio, May 2, 1952.

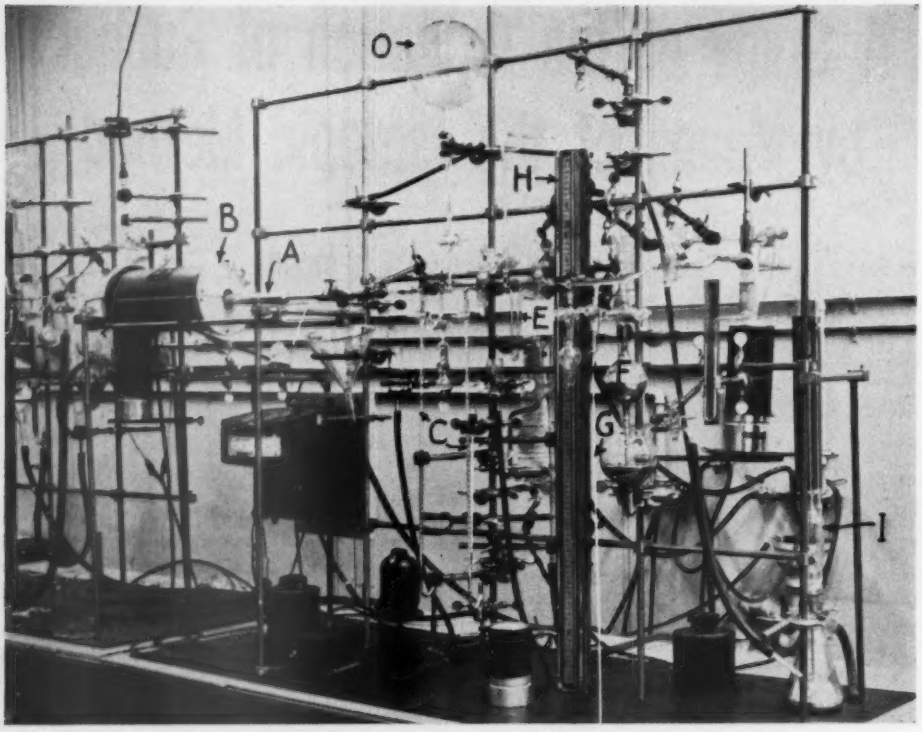

FIG. 1—Apparatus used to determine the oxygen content of rubber.

Experimental Procedure

The rubber samples (300-400 mg.) to be analyzed are weighed into a platinum boat on a semimicrobalance to ±0.02 mg. The boat is inserted into the platinum reaction vessel (A), connected to the glass vacuum system and evacuated by a mercury diffusion pump to less than 10^{-4} mm. Hg. After all the air is removed from the platinum tube, a given amount of O^{18} enriched oxygen is measured into the platinum tube. The volume added depends upon the weight of the sample and upon the estimated oxygen content of the sample, since accuracy is highest when the amount of O^{18} labeled oxygen added approximately equals the oxygen content of the sample. The volume of oxygen taken is accurately measured to ±0.002 ml., and corrected to normal temperature and pressure.

The platinum tube containing the rubber and the O^{18} enriched oxygen is then heated in the electric furnace (B) at 800-900° C. for two 30-minute periods with a 5-minute dry ice period between the two heating periods. The purpose of this cooling is to pull back into the reaction zone any fraction of the sample that may distill unexchanged into the plugged portion of the platinum tube. After the second 30-minute heating period, the reaction gases are sampled and then quickly removed from the platinum tube by means of the Toepler pump (F).

When rubber containing small amounts of oxygen is burnt with O^{18} enriched O_2, the gases formed consist mainly of H_2 and CH_4, with small amounts of CO and CO_2. To calculate the percent oxygen in the rubber the O^{18}/O^{16} ratio of the oxygen in either the CO_2 or CO has to be determined. It is preferable to use the CO_2 because N_2 will interfere with the CO analysis. Since N_2 and CO^{16} both give 28 mass peaks on the mass spectrometer, the presence of N_2 will give low ratios of

TABLE I—SAMPLES OF SMOKED SHEET IN VARIOUS STAGES OF OXIDATION

Sample No.	Condition of Oxidation	Weight of Sample, g.	Weight Gain g.	Weight Gain %
1	Unoxidized			
2	Degassed at 25° C. for 26 hrs...	0.44946	—0.00253	—0.56
3	Degassed at 25° C. for 55 hrs...	0.42992	—0.00255	—0.59
4	Degassed at 25° C. for 160 hrs...	0.37041	—0.00134	—0.39
5	Degassed at 60° C. for 48 hrs...	0.33829	—0.00086	—0.25
6	O_2 bomb, 6 hrs. at 70° C. No. 1	14.97092	—0.01819	—0.12
7	O_2 bomb, 17 hrs. at 70° C. No. 1	12.84808	+0.00796	0.06
8	O_2 bomb, 30 hrs. at 70° C. No. 1	14.34183	0.01180	0.08
9	O_2 bomb, 30 hrs. at 70° C. No. 2	13.09635	0.02097	0.16
10	O_2 bomb, 30 hrs. at 70° C. No. 3			
11	O_2 bomb, 53 hrs. at 70° C. No. 3	13.2951	0.1166*	0.87
12	O_2 bomb, 77 hrs. at 70° C. No. 3	11.8491	0.1038*	0.88
13	O_2 bomb, 100 hrs. at 70° C. No. 3	10.5345	0.0987*	0.94
14	O_2 bomb, 123 hrs. at 70° C. No. 3	9.3259	0.0924*	0.99
15	O_2 bomb, 195 hrs. at 70° C. No. 3	8.3579	0.1421*	1.70
16	O_2 bomb, 218 hrs. at 70° C. No. 3	5.7372	0.1423*	2.48
17	O_2 bomb, 30 hrs. at 70° C. + 64 hrs. at 82.5° C.			
18	Geer oven, 18 days at 105° C....			
19	O_3 treated			
20	Passed two times through plasticator			

* Weight gain over sample No. 10.

TABLE II—OXIDATION OF SMOKED SHEET RUBBER

Sample	Weight of Rubber, gms.	Change in Weight mg.	Change in Weight %
Unoxidized	15.61507		
Oxidized in O_2 bomb 30 hrs. at 70° C...	15.63580	+20.73	+0.133
1 day in air at 27° C.	15.61730	+ 2.23	+0.014
2 days in air at 27° C.	15.61704	+ 1.97	+0.012
5 days in air at 27° C.	15.60499	—10.08	—0.064

TABLE III—DETERMINATION OF OXYGEN CONTENT BY ISOTOPIC METHOD ON SMOKED SHEET RUBBER OXIDIZED IN O_2 BOMB

Sample	*a* Weight of Sample, mg.	*b*** Weight of Oxygen-18 Gas, mg.	Atom % O^{18} Above Normal Concentrations* *m* in *b*	*n* in Equi-librated Mixture	Observed % Oxygen in Substance	Average
Smoked sheet rubber A	418.62	5.50	5.1080	1.7932	2.46	
	409.77	6.69	5.0795	2.0657	2.42	
	424.24	6.35	5.0795	1.8606	2.59	
	418.42	6.89	5.0795	1.9973	2.55	2.50 ± 0.07
O_2 bomb, 6 hrs. at 70° C.	361.40	5.11	5.0795	2.1032	2.15	2.15
O_2 bomb, 17 hrs. at 70° C.	369.82	4.72	5.0795	1.7939	2.55	2.55
O_2 bomb, 30 hrs at 70° C. No. 1	313.54	4.49	5.0795	1.9239	2.43	
No. 1	326.59	4.27	5.0795	1.8114	2.45	2.44 ± 0.01
No. 2	364.96	4.72	5.0795	1.6218	2.76	2.76
No. 3	351.54	7.04	5.1060	1.7932	2.27	
No. 3	352.78	4.99	5.0795	1.8357	2.50	
No. 3	328.34	4.23	5.0795	1.8287	2.36	2.38 ± 0.08
O_2 bomb, 53 hrs. at 70° C.	415.30	5.23	5.0795	1.7652	2.67	
	409.93	5.19	5.1284	1.7485	2.45	
	356.54	4.27	5.0795	1.5691	2.70	2.61 ± 0.10
O_2 bomb, 77 hrs. at 70° C.	411.95	5.66	5.0795	1.5416	2.38	
	329.61	3.06	5.0795	1.4677	2.29	2.34 ± 0.04
O_2 zomb, 100 hrs. at 70° C.	375.09	6.57	5.0795	1.9365	2.85	2.85
O_2 bomb, 123 hrs. at 70° C.	299.58	4.72	5.0795	2.0189	3.02	3.02
O_2 bomb, 195 hrs. at 70° C.	235.42	4.11	5.0795	1.5401	4.04	
	447.65	7.35	5.0795	1.5429	4.14	4.09 ± 0.05
O_2 bomb, 218 hrs. at 70° C.	314.60	6.99	5.0795	1.6433	4.66	
	415.73	7.39	5.0795	1.3892	4.82	4.74 ± 0.08
O_2 bomb, 30 hrs at 70° C. + 64 hrs. at 82.5° C.	303.23	4.53	5.1080	1.0388	5.88	5.88

* The normal atomic concentration of O^{18} is ~ 0.21%. Accurate normal concentrations were determined for each analysis.
** The weight of oxygen was calculated from the volume of gas added by means of the perfect gas law.

O^{18}/O^{16} in the CO (high oxygen values in the rubber). For maximum accuracy it is advisable to concentrate the CO_2 in the gas analyzed by passing the gases through a liquid N_2 trap. The non-condensible gases (CO, H_2 and some CH_4) are sampled and evacuated leaving the condensible gases (CO_2 and CH_4) behind in the liquid nitrogen trap. To further concentrate the CO_2, the condensible gases are warmed from —195° C. to —145° C. by replacing the liquid nitrogen trap with a melting isobutane bath (m.pt. = —145° C.). Upon warming to —145° C., the methane is pumped off at a pressure of not below 0.5 mm., leaving behind highly concentrated CO_2.*

* The vapor pressure of CO_2 is 0.24 mm. at —145° C.

Preparation of Samples

The rubber samples analyzed in this paper were smoked sheet rubber treated under a number of different conditions, such as:

(a) Oxidation in O_2 bomb under 200 psi pressure at various temperatures and lengths of time.
(b) Dehydrated in high vacuum.
(c) Oxidation in Geer oven at 105° C.
(d) Ozonation.
(e) Milling of rubber.

Whenever possible the changes in weight of the rubber were recorded throughout the oxidation period. Table I lists, in detail, the various samples of smoked sheet rubber analyzed.

TABLE IV—EFFECT OF GEER OVEN, PLASTICATOR AND OZONE ON OXYGEN CONTENT OF RUBBER

	a Weight of Sample, mg.	*b*** Weight of Oxygen-18 Gas, mg.	Atom % O^{18} above Normal Concentration* *m* in *b*	*n* in Equi-librated Mixture	Observed % Oxygen in Substance
Smoked Sheet Rubber, Sample A	418.42	6.89	5.0795	1.9973	2.55
S. S. Rubber A, Oxidized for 18 days at 105° C. in Geer Oven	233.46	3.87	5.1080	2.2819	2.07
Smoked Sheet Rubber, Sample B	408.92	4.85	5.1080	1.9532	1.93
S. S. Rubber B, 2 Passes through Plasticator	405.40	4.75	5.1080	1.9980	1.83
S. S. Rubber B, Ozone (O_3) Treated	405.79	5.28	5.1080	2.4393	1.42

* The normal atomic concentration of O^{18} is ~ 0.21%. Accurate normal concentrations were determined for each analysis.
** The weight of oxygen was calculated from the volume of gas added by means of the perfect gas law.

TABLE V—A COMPARISON OF OXYGEN VALUES OBTAINED BY THE ISOTOPIC METHOD AND BY GAIN IN WEIGHT

Oxidation Time, Hrs. (O_2 Bomb at 70° C.)	Period Between Weighing After Oxidation and Analysis	% Oxygen in S. S. Rubber By Gain in Weight Gain %	Total %	By Isotopic Method*
0	———	——	2.50	2.50
6	2 days	—0.12	2.38	2.15
17	2-3 hours	+0.06	2.56	2.55
30 No. 1	2 weeks	+0.08	2.58	2.44
30 No. 2	3 weeks	+0.16	2.66	2.76
30 No. 3**	2-6 months	——	2.38	2.38
53	2-6 months	+0.87	3.25	2.61
77	2-6 months	+0.88	3.26	2.34
100	2-6 months	+0.94	3.32	2.85
123	2-6 months	+0.99	3.37	3.02
195	2-6 months	+1.74	4.12	4.09
218	2-6 months	+2.48	4.86	4.74

* Average of 2-4 analyses.
** Obtained oxidized from Lee Rubber and Tire Corp. Difference in weight of unoxidized and 30-hour oxidized rubber not known.

Some oxidized samples were observed to lose some of the absorbed oxygen upon standing. The magnitude of this loss may be seen from the data in Table II.

Experimental Results

(A) Oxygen Analyses of Rubber: The unoxidized samples of smoked sheet and the various oxidized samples were analyzed for oxygen content by the isotopic method of analysis. The results obtained for the rubber samples oxidized in the O_2 bomb are given in Table III. It can be seen from these results that the reproducibility by this method is very good.

The change in oxygen content of the smoked sheet upon oxidizing in the Geer oven, passing through plasticator, and upon ozone (O_3) treating is shown in Table IV.

A check on the Isotopic Method showed that the results obtained agreed with the values obtained by gain in weight to ±0.18%.

In these experiments two series of smoked sheet rubber were oxidized at 70° C. in the O_2 bomb and the changes in weight of the rubber recorded. In one series four samples of the same rubber were oxidized, one for 6 hours, another for 17 hours and the remaining two for 30 hours in different O_2 bombs. In the second series a sample of previously oxidized rubber (30 hours at 70° C. in O_2 bomb) was further oxidized. Weight changes were recorded periodically and samples taken until the rubber had been oxidized for 188 hours (total oxidation time being 218 hours).

A comparison of the oxygen values obtained by the Isotopic Method and those obtained from the changes in weight of the rubber is shown in Table V. In this comparison the assumption is made that the values obtained by the Isotopic Method for the rubber before oxidation are the correct ones. The comparison shows that the oxygen values obtained by the Isotopic Method agree nicely with the "Gain in Weight" values except for the 53, 77 and 100-hour oxidation samples. The

TABLE VI—DETERMINATION OF OXYGEN CONTENT BY ISOTOPIC METHOD ON SMOKED SHEET RUBBER

Sample	*a* Weight of Sample, mg.	*b*** Weight of Oxygen-18 Gas, mg.	Atom % O^{18} Above Normal Concentrations* *m* in *b*	*n* in Equilibrated Mixture	Observed % Oxygen in Substance	Average
Smoked sheet rubber A	418.62	5.50	5.1080	1.7932	2.46	
	409.77	6.69	5.0795	2.0657	2.42	
	424.24	6.35	5.0795	1.8606	2.59	
	418.42	6.89	5.0795	1.9973	2.55	2.50 ± 0.07
Smoked sheet rubber A evacuated for 55 hrs. at 10^{-4} mm.	429.18	5.18	5.0795	2.0189	1.83	
Smoked sheet rubber A evacuated for 26 hrs. at 10^{-4} mm.	401.95	5.53	5.0795	2.2215	1.77	
Smoked sheet rubber A evacuated for 160 hrs. at 10^{-4} mm.	370.02	3.93	5.0795	1.7911	1.95	1.85 ± 0.07
Smoked sheet rubber A heated at 60° C. while evacuating at 10^{-4} mm. for 48 hrs.	337.0	4.37	5.0795	2.0540	1.91	1.91
Smoked sheet rubber B	408.92	4.85	5.1080	1.9532	1.93	1.93
Smoked sheet rubber B evacuated for 56 hrs. at 10^{-4} mm.	432.71	4.06	5.1159	2.1557	1.29	1.29

* The normal atomic concentration of O^{18} is ~ 0.21%. Accurate normal concentrations were determined for each analysis.
** The weight of oxygen was calculated from the volume of gas added by means of the perfect gas law.

TABLE VII—DETERMINATION OF CHEMICALLY COMBINED OXYGEN IN RUBBER

	% Loss in Weight	% O in Rubber— Calculated from Loss in Weight	By Isotopic Method
Smoked sheet rubber A	——	——	2.50
Smoked sheet rubber A evacuated for 55 hrs. at 25° C.	0.59	1.91	1.83
evacuated for 26 hrs. at 25° C.	0.56	1.94	1.77
evacuated for 160 hrs. at 25° C.	0.39	2.11	1.95
Average	0.52	1.98	1.85
Smoked sheet rubber A evacuated for 48 hrs. at 60° C.	0.25	2.25	1.91
Smoked sheet rubber B	——	——	1.93
Smoked sheet rubber B evacuated for 56 hrs. at 25° C.	0.54	1.39	1.29

TABLE VIII—OXIDATION TIME VS. OXYGEN CONTENT

(O_2 Bomb at 70° C.)

Sample	% Oxygen in Rubber — By Gain in Weight — Gain %	Total %	By Isotopic Method
Smoked Sheet Rubber, Degassed	—0.52	1.98	1.85
Smoked Sheet Rubber, Original	——	——	2.50
Smoked Sheet Rubber, After 6 hrs. in O_2 bomb at 70° C.	—0.12	2.38	2.15
Smoked Sheet Rubber, After 17 hrs. in O_2 bomb at 70° C.	0.06	2.56	2.55
Smoked Sheet Rubber, No. 1, After 30 hrs. in O_2 bomb at 70° C.	0.08	2.58	2.44
Smoked Sheet Rubber, No. 2, After 30 hrs. in O_2 bomb at 70° C.	0.16	2.66	2.76
Smoked Sheet Rubber, No. 3*, After 30 hrs. in O_2 bomb at 70° C.	——	2.38	2.38
Smoked Sheet Rubber, No. 3, After 53 hrs. in O_2 bomb at 70° C.	0.87	3.25	2.61
Smoked Sheet Rubber, No. 3, After 77 hrs. in O_2 bomb at 70° C.	0.88	3.26	2.34
Smoked Sheet Rubber, No. 3, After 100 hrs. in O_2 bomb at 70° C.	0.94	3.32	2.85
Smoked Sheet Rubber, No. 3, After 123 hrs. in O_2 bomb at 70° C.	0.99	3.37	3.02
Smoked Sheet Rubber, No. 3, After 195 hrs. in O_2 bomb at 70° C.	1.74	4.12	4.09
Smoked Sheet Rubber, No. 3, After 218 hrs. in O_2 bomb at 70° C.	2.48	4.86	4.74

* Obtained from Lee Rubber & Tire Corp. Difference in weight of unoxidized and 30-hour oxidized rubber not known.

explanation for the low values is based on the observation noted in Table II, namely, that some samples upon standing tend to lose some of the oxygen-containing compounds absorbed in the rubber. This is confirmed by comparing the time elapsed between oxidation and analysis of samples with the agreement between the "Gain in Weight" and the Isotopic oxygen values shown in Table V.

When the oxidized rubber samples are analyzed immediately after oxidation the results obtained are nearer the values calculated from "Gain in Weight" than the results of those samples analyzed a week to two months later. In the case of the 123, 195 and 218-hour samples, however, good agreement is obtained even though these samples were analyzed from 2 to 6 months after oxidation. This is explained by the fact that these samples, being molten and tacky, were completely combined chemically with the oxygen, while in the other samples some of the oxygen was only absorbed by the rubber either as O_2 gas or other oxygen-containing compound. This physically absorbed oxygen, upon standing, diffuses out of the rubber.

It can be seen from Table V that the oxygen content of the rubber during the initial stages of oxidation is lower than in the unoxidized rubber. The same phenomena can be seen in Table IV for the samples oxidized in the Geer oven, treated with ozone, and passed through the plasticator. This indicates that some oxygen-containing substance, dissolved in the rubber, was released during oxidation and heating.

In order to determine only the chemically combined oxygen content of the rubber and not the dissolved oxygen content, some samples of rubber were first degassed and dehydrated at $<10^{-4}$ mm. Hg. pressure and 25° C. for 48 to 160 hours before analyzing for the oxygen content by the Isotopic Method. Another sample analyzed was first evacuated at 60° C. for 48 hours. The results obtained are shown in Table VI and are compared with the loss in weight values in Table VII.

(B) Effect of Oxidation on Oxygen Content: A comparison of the oxygen content of rubber oxidized in the O_2 bomb at 70° C. with the oxidation time is shown in Table VIII and Figure 2, using the oxygen content of the degassed rubber as zero oxidation time values. It can be seen from Figure 2 that during the first 30 hours of oxidation there was a gradual increase in oxygen content. Upon further oxidation for another 100 hours

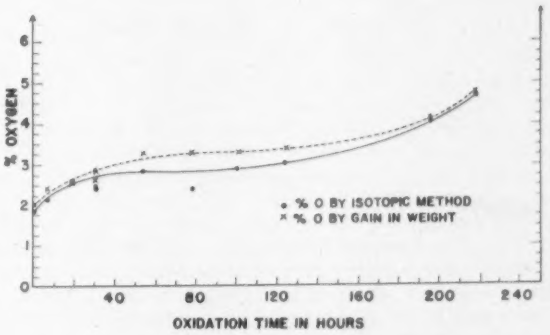

FIG. 2—Oxidation of smoked sheet rubber in O_2 bomb at 70° C. and 200 psi O_2.

no increase in oxygen content was observed, indicating that all the double bonds were oxidized by 30 hours of oxidation. Additional oxidation after 130 hours caused molecular degradation and subsequent oxidation of the split molecule as observed by the increase in the oxygen content and the softening of the rubber.

The effect of plastication, ozonation and heating in the Geer oven on the oxygen content of the smoked sheet rubber is shown in Table IX. It can be seen that the oxygen content of the rubber increased in all three cases.

TABLE IX—EFFECT OF PLASTICATOR, OZONE AND GEER OVEN ON OXYGEN CONTENT OF SMOKED SHEET RUBBER

Sample	% Oxygen by Isotopic Method
Degassed Smoked Sheet Rubber A	1.85
Smoked Sheet Rubber A, Heated for 18 days at 105° C. in Geer Oven	2.07
Degassed Smoked Sheet Rubber B	1.29
Smoked Sheet Rubber B, Ozone (O_3) Treated	1.42
Smoked Sheet Rubber B, 2 Passes through Plasticator	1.83

(C) Determination of Gases Removed from Rubber: It was observed that the oxygen content of the rubber decreased upon degassing, indicating the removal of oxygen-containing substances. In order to determine what gases were being emitted from the rubber upon degassing, the automatic Toepler pump degassing system shown in Figure 3 was used. The system consisted of a 2-liter flask (A), two drierite tubes (B), an automatic Toepler pump (C) connected to a relay (E), a 2-liter gas reservoir (D), a vacuum pump and manometer (F). The system was evacuated for each experiment and filled with dry nitrogen. 750-850 grams of rubber were put into the flask (A) and the system evacuated to approximately 50 mm. Hg. pressure. The drierite tubes (B) were cooled with dry ice and the automatic Toepler pump (C) started and run for 30 days at room temperature. The gases removed by the Toepler pump were stored in the 2-liter reservoir (D).

It was observed, by means of the manometer (F), that all the gas was removed within 24 hours. Further pumping only increased the amount of water removed.

An analysis of the products removed, as tabulated below, showed that water was the only constituent removed from the rubber:

Compound	Weight % of Rubber
H_2O	0.28
N_2	0.06*
O_2	0.01*
CO	Trace
CO_2	Trace
A	Trace

* From 50 mm. gas left in flask at start.

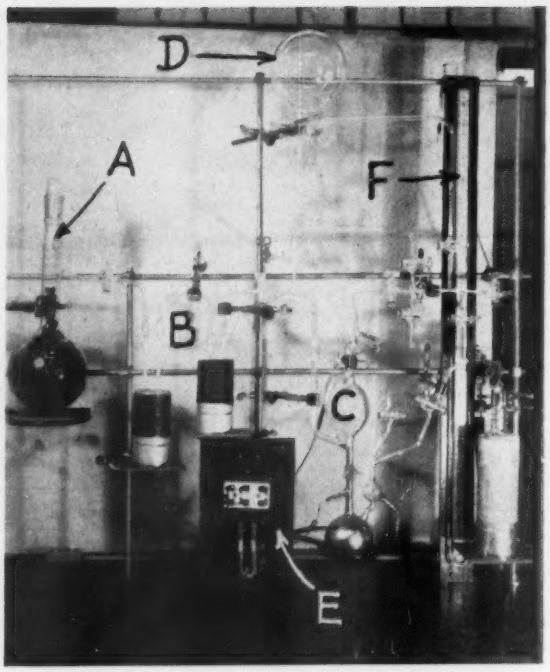

FIG. 3—The automatic Toepler pump degassing system.

Summary

(1) The Isotopic Method of analysis was used to determine the oxygen content of rubbers passed through the plasticator, exposed to ozone, oxidized in the Geer oven and in the O_2 bomb. The oxygen values obtained agreed very well with the "Gain in Weight" values.

(2) The oxidation of rubber in the O_2 bomb at 70° C. was studied by means of the Isotopic Method of analysis. The results obtained showed a gradual increase in the oxygen content of the rubber during the first 30 hours of oxidation, indicating the oxidation of double bonds and oxidizable chain terminals. It appears that all of the double bonds were oxidized during the 30-hour period, since the oxygen content of the rubber did not increase in an additional 100 hours of oxidation. With still further oxidation, the oxygen content of the rubber started increasing again, indicating a splitting and subsequent oxidation of the rubber molecule.

ACKNOWLEDGMENT

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Increased production and minimum maintenance are major features of a new type of **change-can mixer** offered by Industrial Process Engineers, 8 Lister Ave., Newark 5, N. J. The new mixer is designed primarily for use where a number of different products are made by mixing directly in cans or drums, such as in the blending, thinning and tinting of paints, varnish or other chemicals.

The addition of a new series of **¼-inch in-line solenoid-operated air valves** to its regular line has been announced by Mechanical Air Controls, Inc., 15311 West 11 Mile Road, Detroit 37, Mich. The new series is available for straightway and 3-way application in both normally open and normally closed types.

The addition of a new model to its line of wet blasting machines has been announced by the American Wheelabrator & Equipment Corp., Mishawaka, Ind. Known as the **Model 64 Liquamatte,** it is intended for all precision cleaning and finishing applications involving large and heavy pieces.

ACRYLIC ELASTOMERS

Preparation and Properties of Vulcanizable Acrylic Ester-Acrylonitrile Copolymers

By E. M. FILACHIONE, T. J. FITZPATRICK, C. E. REHBERG, C. F. WOODWARD, W. E. PALM, and J. E. HANSEN

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EARLIER investigations at this Laboratory *(3, 6, 7, 8, 9)* resulted in the development of an acrylic elastomer called Lactoprene EV, which could be vulcanized to a rubberlike material with some unusual properties. This elastomer, a copolymer of 95 percent ethyl acrylate and 5 percent chloroethyl vinyl ether, was vulcanizable with sulfur and organic amines, such as Trimene Base.† The vulcanizates showed unusual resistance to heat and hot mineral oils as well as to atmospheric degradation and flexural breakdown. Commercial modifications, known as Hycar PA-21 and Hycar PA-31, have subsequently become available *(1, 11)*.

More recently another acrylic elastomer, a copolymer of butyl acrylate and acrylonitrile, called Lactoprene BN, was developed in this Laboratory *(4, 5)*. This new elastomer showed the desirable heat-resisting properties of Lactoprene EV; furthermore, the low-temperature properties and the resistance to swelling by boiling water were considerably improved over those of Lactoprene EV.

This paper reports the preparation of Lactoprene BN, the butyl acrylate-acrylonitrile copolymer, as well as other acrylate-acrylonitrile copolymers. A preliminary evaluation of the heat stability and the temperature of embrittlement of the vulcanizates is also reported.

Preparation of Polymers

Emulsion Polymerization: The method for emulsion polymerization was in general similar to that described previously *(8, 10)*. The preparation of the butyl acrylate-acrylonitrile copolymer, described below, is typical.

The acrylate monomer was purified by vacuum distillation in the presence of hydroquinone, and the redistilled monomer was freed of traces of hydroquinone by washing with cold dilute sodium hydroxide, followed by washing with water to remove alkali. The commercial grade acrylonitrile was distilled at atmospheric pressure.

The polymerization charge was as follows: Monomer, 100 parts; distilled water, 200 parts; emulsifier, 1-2 parts; and potassium persulfate, 0.02-0.03 part. Water and the emulsifying agent were charged into a three-necked flask fitted with a stirrer, reflux condenser, and thermometer. The monomer mixture was added, with continuous stirring, and the flask was heated by steam until the temperature of the contents was about 70° C. Then 0.01 part of potassium persulfate was added, and heating continued. When the temperature of the charge reached approximately 87-91° C., vigorous polymerization set in. At this stage heating with steam was discontinued, and the reaction was kept under control by periodically cooling the flask with a stream of tap water. Even with as large a batch as 3000 g. of monomer, proper intermittent cooling permitted polymerization to proceed under reflux at a high rate but still under control.

When the vigorous polymerization had subsided (after approximately one-half hour), an additional 0.01 part of potassium persulfate was added, and the reaction was heated again by steam. This additional catalyst usually produced a further mild polymerization. A third 0.01 part of potassium persulfate was added after another one-half hour. The temperature of the refluxing emulsion generally rose to approximately 98° C., indicating almost complete polymerization had taken place. The temperature of the refluxing mixture was a valuable aid in following the course of polymerization, gradually increasing as monomer was consumed. Sampling of the polymerization mixture, as described under "Redox Polymerization," provided data for the approximate conversion curve (Fig. 1), from which it can be seen that approximately 70 percent of the monomer is converted to polymer in one-half hour.

When an attempt was made to prepare an emulsion containing 50 percent solids (87.5 percent butyl acrylate —12.5 percent acrylonitrile copolymer), considerable difficulty was encountered with foaming. Furthermore,

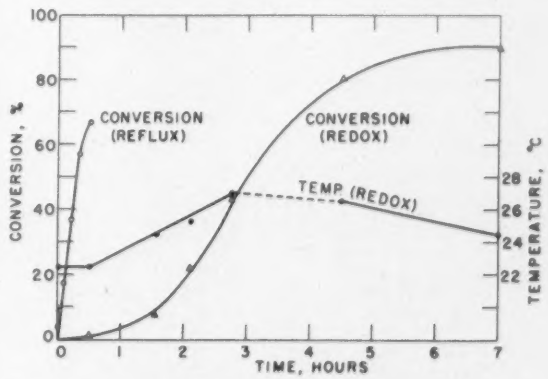

FIG. 1—Conversion curves for the polymerization of 87.5% butyl acrylate-12.5% acrylonitrile.

* One of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

† The mention of specific brands is not to be construed as an endorsement by the U. S. Department of Agriculture over brands not mentioned.

TABLE I—PREPARATION OF BUTYL ACRYLATE-ACRYLONITRILE COPOLYMER (LACTOPRENE BN)

Co-polymer No.	Monomers, wt., % Butyl Acrylate	Acrylo-nitrile	Emulsifiers, %[a]	$K_2S_2O_8$, %[a]	Temp., °C.[b]	Time, hrs.	Polymer Con-version, %	Polymer Yield, %	% Nitrogen in Polymer	% Nitrogen in Monomer Charge	Intrinsic Viscosity[c]
1	95.0	5.0	Dupanol ME, 1	0.03	91-98.5	3.8	94	97	1.10	1.32	Insol.
2	90.0	10.0	Dupanol ME, 1	0.03	89-98.5	2.4	96	99	2.35	2.64	Insol.
3	85.0	15.0	Dupanol ME, 1	0.02	87-96	5.0	91	96	3.33	3.96	4.68
4	75.0	25.0	Dupanol ME, 1	0.03	83-96	3.0	96	101	6.24	6.60	Insol.
5	87.5	12.5	Dupanol ME, 1	0.03	88-98	2.8	94	98	2.75	3.30	4.81
6[d]	87.5	12.5	Dupanol ME, 1	0.02	91-98.5	5.7	89	95	2.86	3.30	3.38
7[e]	87.5	12.5	Dupanol ME, 0.5	0.03	88.5-96	2.8	83	91	2.54	3.30	4.10
8	87.5	12.5	Na Stearate, 2	0.06	90-97	2.0	71[f]	75[f]	3.07	3.30	2.35
9	87.5	12.5	Triton 720, 2	0.03	87-95	2.0	89	96	2.81	3.30	Insol.
10	87.5	12.5	Triton 720, 1 Tergitol Paste No. 4, 1	0.05	88.5-97	2.5	92	97	3.01	3.30	Insol.
11[g]	87.5	12.5	Dupanol ME, 2	Redox	22.5-27	7.0	91	91	2.46	3.30	Insol.

(a) 100% solids based on monomer; catalyst added in separate portions of 0.01%. (b) Initial and final temperature of refluxing polymerization mixture. (c) In acetone at 28° C. Insol. denotes presence of a gel component. (d) A semi-continuous polymerization. Monomers fed in one stream; H_2O, emulsifier, and $K_2S_2O_8$ (0.01%) fed in the other, over a period of 2.5 hours. Conversion at end of this stage was 73%. Heating with additional 0.01% $K_2S_2O_8$ increased conversion to 89%. (e) Polymerization carried out in stainless steel vessel with brass and copper fittings. (f) Some loss of monomer during vigorous portion of polymerization. (g) Redox polymerization under N_2. Initiated by 0.06% $K_2S_2O_8$ and 0.03% $NaHSO_3$.

the emulsion thickened so much that stirring was ineffective. The preparation of a 40 percent solids latex, however, was not so difficult, although considerable foaming occurred.

Unreacted monomer was next removed from the emulsion by passing live steam into the emulsion. During this stripping of monomer, the flask was heated externally by steam to minimize lowering the solids content by condensation. The emulsion was then broken by pouring it into an equal volume of 0.25 percent aluminum sulfate solution at approximately 50° C. The copolymer usually separated as a nice white granular material, which was thoroughly washed and finally dried at 50-55° C. in a circulating air oven. Some copolymers, particularly the copolymers of the acrylic esters higher than butyl, separated as a spongy mass; however, this was easily washed and shredded. Often when the polymer tended to precipitate as one large mass, this was prevented by adding about 1 gram of Dupanol ME to the aluminum sulfate solution prior to the addition of the emulsion. Table I summarizes the preparation of various butyl acrylate-acrylonitrile copolymers (Lactoprene BN). Table II summarizes the preparation of other acrylic ester-acrylonitrile copolymers. It can be seen that the yields, based on monomer actually consumed, are almost quantitative.

TABLE II—PREPARATION OF ACRYLIC ESTER-ACRYLIC NITRILE COPOLYMERS[a]

Co-polymer No.	Monomers, wt., %		Temp.,[b] °C.	Time, hrs.	Polymer Con-version, %	Polymer Yield, %	% Nitrogen in Polymer	% Nitrogen in Monomer Charge	Intrinsic Viscosity[c]
12	Ethyl acrylate, 95	Acrylonitrile, 5	82-99	1.4	95	97	1.29	1.32	6.69
13	Ethyl acrylate, 90	Acrylonitrile, 10	82-96.5	1.7	93	97	2.51	2.64	5.98
14	n-Propyl acrylate, 95	Acrylonitrile, 5	85-97	3.3	95	97	1.35	1.32	Insol.
15	n-Butyl acrylate, 95	Methacrylonitrile, 5	92-98	1.5	95	96	1.05	1.04	Insol.
16	n-Butyl acrylate, 85	Methacrylonitrile, 15	93-99.5	5.0	93	94	2.98	3.13	2.73
17	n-Amyl acrylate, 95	Acrylonitrile, 5	94-97	3.5	89	93	1.28	1.32	Insol.
18	n-Hexyl acrylate, 91	Acrylonitrile, 9	87-96	3.5	81	96	1.69	2.38	Insol.
19	n-Hexyl acrylate, 90[d]	Acrylonitrile, 10[d]	20-30[d]	5.8	96	98	2.03	2.64	3.67
20	n-Octyl acrylate, 90	Acrylonitrile, 10	91-97	3.5	96	98	2.11	2.64	Insol.
21	n-Octyl acrylate, 85	Acrylonitrile, 15	88-97	2.4	95	97	3.54	3.96	Insol.
22	n-Octyl acrylate, 80	Acrylonitrile, 20	83-97	4.0	90	94	4.88	5.28	Insol.
23	2-Ethylhexyl acrylate, 90	Acrylonitrile, 10	86-97.5	1.8	94	—	——	2.64	——
		Terpolymers							
24	Ethyl acrylate, 10 Butyl acrylate, 80	Acrylonitrile, 10	89-97	2.5	90	97	2.36	2.64	3.00
25	Ethyl acrylate, 20 Butyl acrylate, 70	Acrylonitrile, 10	87-98	2.3	93	98	2.37	2.64	4.95
26	Ethyl acrylate, 40 Butyl acrylate, 50	Acrylonitrile, 10	84-98	3.5	93	97	2.32	2.64	5.27
27	Ethyl acrylate, 10 n-Octyl acrylate, 80	Acrylonitrile, 10	88-97	2.5	94	—	2.40	2.64	Insol.
28	Ethyl acrylate, 20 n-Octyl acrylate, 70	Acrylonitrile, 10	86-98	3.0	94	—	2.45	2.64	Insol.
29	Ethyl acrylate, 30 n-Octyl acrylate, 60	Acrylonitrile, 10	84-97	4.0	95	—	2.47	2.64	Insol.

(a) 1% Dupanol ME and 0.02-0.03% $K_2S_2O_8$ (based on monomer), except Copolymers 15, 16, and 17, in which 0.05% $K_2S_2O_8$ was used, and Copolymer 19 (footnoted). (b) Initial and final temperature of refluxing polymerization. (c) In acetone at 28° C. Insol. denotes presence of a gel component. (d) Redox polymerization under N_2 with 0.06% each of $K_2S_2O_8$ and $NaHSO_3$ followed by an additional 0.06% each after 2.5 hours.

TABLE III—RECIPES USED FOR EVALUATION STUDIES

Recipe [a]	A	B	C	D	E	F	G	H	I	J	K	L
Copolymer	100	100	100	100	100	100	100	100	100	100	100	100
Carbon black (Furnex)	50	50	50	50	50	50	50	50	50	50	50	50
Carbon black (Philblack O)	—	—	—	—	—	—	—	—	—	—	—	—
Stearic acid	1	1	1	1	1	1	1	1	1	1	1	1
Sulfur	0	0	1	0.5	0.25	0.75	0.5	0.5	0.5	1	1	1
Triethylene tetramine	1	2	0.5	0.5	1	0.75	1	1.5	2	1	1.5	2

Recipe [a]	M	N	O	P	Q	R	S	T	U	V	W
Copolymer	100	100	100	100	100	100	100	100	100	100	100
Carbon black (Furnex)	50	50	50	50	50	50	50	—	—	—	—
Carbon black (Philblack O)	—	—	—	—	—	—	—	50	50	50	50
Stearic acid	1	1	1	1	1	1	1	1	1	1	1
Sulfur	1	2	3	4	5	3	4	1	1	1	1
Triethylene tetramine	2.5	1	1	1	1	1.5	2	1	1.5	2	2.5

(a) Ingredients given in parts by weight.

Reduction Activation ("Redox") Polymerization in Emulsion: The recipe used was 350 g. of butyl acrylate, 50 g. of acrylonitrile, 800 ml. of distilled water, 8 g. of Dupanol ME, 0.24 g. of potassium persulfate, and a total of 0.12 g. of sodium bisulfite (Copolymer 11, Table I). Potassium persulfate plus sodium bisulfite was first used by Bacon *(2)* as a reduction activation system to polymerize acrylonitrile. All the ingredients except the bisulfite were charged into a flask immersed in tap water (approximately 23° C.). The flask was equipped with stirrer, condenser, thermometer, and a nitrogen inlet tube; a stopcock sealed to the bottom of the flask facilitated sampling of the polymerization mixture. Nitrogen was then passed into the flask, and after 10 minutes 0.06 g. of sodium bisulfite was added. Forty minutes later an additional 0.06 g. of sodium bisulfite was added.

Seventy minutes after the first addition of bisulfite the polymerization began. It occurred smoothly, and no great evolution of heat was noted. The polymerization, which was followed by periodically withdrawing samples of the emulsion into a stopping solution of 1 percent hydroquinone and evaporating to dryness (Fig. 1), appeared to be completed after 7 hours. The emulsion was then steam-distilled. Only 3 g. of monomer was recovered. The polymer was obtained by pouring the latex into 0.25 percent aluminum sulfate. After drying, 362 g. (91% yield) of polymer was obtained.

A hexyl acrylate-acrylonitrile copolymer was also prepared by Redox polymerization (Copolymer 19, Table II).

Vulcanization of Polymers

These copolymers were relatively free of tack and were readily handled in the conventional rubber compounding equipment. As with Lactoprene EV, no initial breakdown was required. In general, the vulcanization procedure was similar to that described previously for Lactoprene EV *(3)* and Lactoprene BN *(4, 5)*. The copolymer was masterbatched with carbon black and stearic acid in a hot Banbury mixer. Sulfur and triethylene tetramine were added on the mill. The recipes shown in Table III were evaluated in this study. The compounded stocks were aged for only 2 hours before curing at 298° F. for 60 minutes. A mold release agent was generally used to overcome any tendency to adhere to the mold.

Evaluation of Vulcanizates

The tensile tests were conducted according to ASTM specification D412-41; the die used was similar to die D except that the reduced section of the specimen was ¼-inch wide. The brittle points of the vulcanizates were determined by the method of Selker, Winspear, and Kemp *(12)*. To determine the heat-aging characteristics of these vulcanizates, specimens were heated for 72 hours at 350° F. in a mechanical convection oven.

Discussion of Results

Polymerization: The copolymerization with acrylonitrile of the acrylates through butyl proceeded vigorously. In the higher acrylates, the rate of polymerization was noticeably more moderate. Increasing the acrylonitrile content of the monomer charge also resulted in moderation of the rate of polymerization. Copolymerization of butyl acrylate with methacrylonitrile (Copolymers 15 and 16, Table II) was considerably slower than the copolymerization with acrylonitrile. More catalyst, approximately 0.04 percent, was required to initiate the polymerization, and cooling was not necessary after the polymerization began. The conversion to polymer, however, was equally as good as with acrylonitrile. With a few exceptions, more than 80 percent of the acrylonitrile in the monomer charge entered into the polymer.

The polymerization could be satisfactorily conducted in a stainless steel vessel (Copolymer 7, Table I). The polymerization was also conducted on a semi-continuous basis by feeding the monomer in one stream and the aqueous phase, containing emulsifier and persulfate, in another stream (Copolymer 6, Table I). The two streams were fed to a flask heated by steam and containing a stirrer, condenser, and thermometer. By operation in this manner, the polymerization was conducted almost automatically and with no difficulty of control. The Redox polymerizations also were characteristically mild.

Tensile Properties: The initial tensile properties of the various vulcanizates are shown in Tables IV to VII. The tensile strengths were significantly lower than those of many butadiene stocks; however, the tensile strengths of most of these stocks were well above a serviceable minimum. The vulcanizates of the butyl acrylate copolymers (Tables IV and V) had substantially higher tensile strengths than the octyl acrylate copolymers of comparable acrylonitrile content (Table VI). Increasing the acrylonitrile content of the copolymers

Table IV—Lactoprene BN-12.5 Copolymers[a]

Copolymer No.[b]	Raw Mooney	Vulcanizate[c]	Initial Properties: Tensile Strength, psi.	Ultimate Elong., %	Modulus at 200%, psi.	Hardness[i]	Brittle Point, °F.	Aged 72 Hrs. at 350° F.: Tensile Strength, psi.	Ultimate Elong., %	Modulus at 100%, psi.	Hardness[i]	Brittle Point, °F.
8[d]	37.5	J	1240	490	480	52	—11	1110	180	580	71	— 6
		K	1390	400	670	55	— 9	1150	150	750	75	0
		L	1330	200	1330	71	——	1340	80	0	86	——
		M	1360	180	——	73	——	1440	80	——	89	——
10[e]	37.5	J	1090	360	430	57	— 9	1050	170	530	68	0
		K	1270	260	1000	59	—11	1270	90	——	79	— 2
		L	1250	160	——	67	——	1420	70	——	87	——
		M	1410	170	——	69	——	1490	60	——	89	——
9[f]	39.8	J	1360	330	640	50	—24	1030	150	700	68	— 6
		K	1480	300	1000	53	—22	1280	110	1100	73	0
		L	1350	160	——	63	——	1390	80	——	83	——
		M	1400	140	——	68	——	1550	60	——	89	——
11[g]	32.5	J	1230	680	210	38	—27	1000	280	140	48	—22
		K	1380	420	500	44	—27	1050	160	480	61	—18
		L	1360	250	1100	51	—22	1200	110	1140	69	——
		M	1280	110	——	71	—22	1500	60	——	87	——
6[h]	37.5	C	Undercured									
		J	1400	260	1090	52	——	1280	120	1060	70	——
		K	1410	210	1360	59	——	1170	90	——	74	——
		L	1280	110	——	70	——	1580	60	——	86	——
5	34.0	C	900	560	190	35	——	1180	420	1506	42	——
		J	1340	390	510	45	—22	1400	210	540	59	——
		K	1260	190	——	58	——	1340	90	——	76	——
		L	1190	150	——	61	——	1390	80	——	79	——
7	37.8	C	Undercured									
		J	1280	300	690	50	—13	1140	140	660	63	——
		K	1150	200	1150	55	——	1190	100	1190	71	——
		L	1200	130	——	64	——	1330	60	——	83	——

(a) Lactoprene BN-12.5 is the copolymer prepared from a monomer charge of 87.5% butyl acrylate and 12.5% acrylonitrile. (b) Copolymer number corresponds to number of the polymer in Tables I and II. (c) Cures for 60 min. at 298° F. (d) Copolymer was prepared with Na stearate as emulsifier. (e) Triton 702 and Tergitol Paste No. 4 were used as emulsifiers in the polymerization. (f) Triton 720 was the emulsifying agent in preparing the copolymer. (g) Redox copolymer. (h) Semi-continuous polymerization. (i) Shore Durometer A.

Table V—Other Butyl Acrylate Copolymers and Terpolymers

Copolymer No.[a]	Monomer Charge	Raw Mooney	Vulcanizates[b]	Initial Properties: Tensile Strength, psi.	Ultimate Elong., %	Modulus at 200%, psi.	Hardness[d]	Brittle Point, ° F.	Aged 72 Hrs. at 350° F.: Tensile Strength, psi.	Ultimate Elong., %	Modulus at 100% psi.	Hardness[d]	Brittle Point, °F.
1[c]	Butyl acrylate-95	——	T	1230	470	470	58	—29	1160	310	410	71	—20
	Acrylonitrile-5		U	1450	340	770	64	—29	1270	210	610	75	—18
			V	1480	250	1190	69	—29	——	——	——	——	——
			W	1490	180	——	73	——	——	——	——	——	——
1[c]	Butyl acrylate-95	——	J	1120	480	380	54	—36	1070	230	300	54	—33
	Acrylonitrile-5		K	1100	270	740	56	—33	870	120	660	63	—27
			L	1020	220	920	60	—31	——	——	——	——	——
			M	730	150	——	63	—33	——	——	——	——	——
2	Butyl acrylate-90	——	G	1360	250	1020	55	—33	1240	140	——	67	——
	Acrylonitrile-10		J	1400	270	990	56	—29	1190	130	——	70	——
			K	1250	190	——	60	—27	1190	100	——	76	——
			N	1395	280	970	56	—26	1290	130	——	71	——
3	Butyl acrylate-85	52.5	D	1380	570	570	47	—17	1360	240	380	46	— 8
	Acrylonitrile-15		G	1640	230	1450	60	—17	1660	100	1660	77	— 9
			H	1450	140	——	69	——	1720	60	——	87	——
			I	1430	90	——	75	——	1760	40	——	92	——
4	Butyl acrylate-75	85.5	D	1880	240	1790	70	+21	2750	80	——	90	+43
	Acrylonitrile-25		G	1960	140	——	78	——	2810	30	——	99	——
			H	2020	100	——	85	——	Too brittle to test				
			I	2100	60	——	92	——	Too brittle to test				
24	Butyl acrylate-80	35.5	C	910	840	180	34	——	1070	550	130	41	——
	Ethyl acrylate-10		J	1280	390	550	48	—22	1160	200	400	56	—11
	Acrylonitrile-10		K	1150	170	——	59	——	1210	90	0	71	——
			L	1120	140	——	60	——	1140	70	——	77	——
25	Butyl acrylate-70	——	C	Undercured									
	Ethyl acrylate-20		J	1300	380	550	47	—20	1260	180	500	60	——
	Acrylonitrile-10		K	1190	240	930	55	——	1200	120	980	71	——
			L	1150	150	——	60	——	1280	80	——	80	——
26	Butyl acrylate-50	——	C	Undercured									
	Ethyl acrylate-40		J	1420	420	540	48	— 8	1380	210	500	60	——
	Acrylonitrile-10		K	1350	240	1090	57	——	1360	110	1310	74	——
			L	1230	150	——	65	——	1370	70	——	85	——

(a) Copolymer number corresponds to the number of the polymer in Tables I and II. (b) Cured for 60 min. at 298° F. (c) The same copolymer was used with different carbon blacks. (d) Shore Durometer A.

Table VI—Octyl Acrylate Copolymers and Terpolymers

Co-polymer No.[a]	Monomer Charge	Vul-can-izate[b]	Initial Properties: Tensile Strength, psi.	Ultimate Elong., %	Modulus at 200%, psi.	Hard-ness[c]	Brittle Point, °F.	Aged 72 Hrs. at 350° F.: Tensile Strength, psi.	Ulti-mate Elong., %	Modulus at 200%, psi.	Hard-ness[c]
20	n-Octyl acrylate-90 Acrylonitrile-10	A	Undercured								
		J	880	270	600	47	—51	390	70	—	66
		B	800	440	210	35	—	Too brittle to test			
		L	730	130	—	60	—	600	50	—	79
		G	760	420	370	44	—44	360	90	—	65
21	n-Octyl acrylate-85 Acrylonitrile-15	E	970	250	740	50	—44	640	60	—	75
		G									
		J	1100	260	780	52	—42	840	70	—	78
		F	960	300	540	45	—44	680	80	—	71
22	n-Octyl acrylate-80 Acrylonitrile-20	E	1300	150	—	65	—26				
		G	1280	150	—	67	—27	Too brittle to test			
		J	1310	130	—	71	—				
		F	1350	170	—	64	—27				
23	2-Ethylhexyl acrylate-90 Acrylonitrile-10	D	Undercured								
		G	Undercured								
		H	430	480	220	35	—	Too brittle to test			
		I	730	130	—	60	—				
27	n-Octyl acrylate-80 Ethyl acrylate-10 Acrylonitrile-10	A	610	570	150	30	—	Too brittle to test			
		B	630	310	300	37	—	Too brittle to test			
		J	950	370	440	45	—44	460	90	—	65
		L	950	220	870	54	—	600	70	—	75
		G	930	310	550	48	—44	390	70	—	70
28	n-Octyl acrylate-70 Ethyl acrylate-20 Acrylonitrile-10	A	580	700	150	32	—35	250	70	—	61
		J	990	340	290	45	—33	560	110	550	63
		B	650	460	210	35	—	Too brittle to test			
		L	990	110	—	67	—	790	30	—	85
		G	990	260	730	52	—33	390	30	—	70
29	n-Octyl acrylate-60 Ethyl acrylate-30 Acrylonitrile-10	C	Undercured								
		J	1190	360	580	47	—31	770	100	770	71
		K	1200	200	1200	59	—	910	50	—	81
		L	1180	120	—	68	—	1290	40	—	90
		N	1130	320	600	51	—24	750	90	—	75
		O	1070	340	580	51	—	840	80	—	75
		P	1110	350	600	50	—	840	80	—	75
		Q	1150	350	580	50	—	860	80	—	75
		A	690	590	250	40	—	Too brittle to test			
		G	1230	240	990	56	—24	800	70	—	77
		R	1290	140	—	75	—	1290	50	—	90
		S	1290	90	—	81	—	1300	30	—	96

(a) Copolymer number corresponds to number of the polymer in Tables I and II. (b) Cured for 60 min. at 298° F. (c) Shore Durometer A.

Table VII—Miscellaneous Acrylic Copolymers

Co-polymer No.[a]	Monomer Charge	Raw Mooney	Vul-can-izates[b]	Initial Properties: Tensile Strength, psi.	Ulti-mate Elong., %	Modulus at 200%, psi.	Hard-ness[d]	Brittle Point, °F.	Aged 72 Hrs. at 350° F.: Tensile Strength, psi.	Ulti-mate Elong., %	Modulus at 100% psi.	Hard-ness[d]	Brittle Point, °F.
13	Ethyl acrylate-90 Acrylonitrile-10	58.6	C	1410	510	630	52	—	1400	440	580	62	—
			J	1540	310	1060	57	+27	1650	150	1290	77	+43
			K	1550	230	1390	60	+30	1950	90	—	84	+43
			L	1630	150	—	70	—	2440	60	—	94	—
12	Ethyl acrylate-95 Acrylonitrile-5	48.3	C	Undercured									
			J	1410	480	470	49	+16	1510	300	440	60	+25
			K	1400	300	830	56	+18	1520	150	1000	71	+27
			L	1360	210	1280	59	—	1590	110	1420	75	—
17	Amyl acrylate-95 Acrylonitrile-5	22.8	J	730	360	340	36	—45	610	200	140	41	—38
			K	760	300	430	39	—45	680	180	230	48	—42
			L	820	270	600	41	—	730	150	430	53	—
			M	400	140	—	46	—	760	110	540	62	—
18	Hexyl acrylate-91 Acrylonitrile-9		J	790	430	240	43	—49	280	100	280	56	—15
			K	740	200	740	56	—	800	110	750	67	—
			L	940	170	—	61	—	870	90	—	74	—
			L[e]	870	170	—	60	—	—	—	—	—	—
19[d]	Hexyl acrylate-90 Acrylonitrile-10		T	910	670	260	55	—	970	330	290	74	—
			U	1410	390	680	64	—	1110	150	780	84	—
			V[e]	1540	220	1390	74	—	1200	80	—	91	—
15	Butyl acrylate-95 Methacrylonitrile-5	24.0	J	Undercured									
			K	730	490	210	32	—36	690	360	30	37	—36
			L	760	480	230	36	—34	670	300	70	44	—31
			M	830	270	580	41	—	750	170	370	59	—
16	Butyl acrylate-85 Methacrylonitrile-15	28.0	J	450	600	340	45	— 9	530	300	380	62	— 6
			K	580	340	510	60	— 2	590	160	500	82	— 2
			L	700	270	620	68	—	670	130	610	87	—
			M	720	180	—	81	—	750	100	750	94	—

(a) Copolymer number corresponds to the number of the polymer in Tables I and II. (b) Cured for 60 min. at 298° F. (c) Cured for 30 min. at 298° F. (d) Redox copolymer. (e) Shore Durometer A.

appeared to increase the tensile strength (Table V); however, this did not appear to be true in the isolated example of the methacrylonitrile copolymer (Copolymers 15 and 16, Table VII).

In general, the tensiles decreased as the alkyl group of the acrylic ester increased. From previous experience and experiments with Copolymer No. 1 (Table V) and Copolymer No. 19 (Table VII), it is concluded that the tensile strengths can be substantially increased by replacing the Furnex with Philblack O. The tensile strengths of the copolymers of the higher acrylates, particularly octyl acrylate, were increased by replacing part of the higher acrylate with ethyl acrylate (Copolymers 27, 28, 29, Table VI). As compared with the ethyl acrylate-acrylonitrile and butyl acrylate-acrylonitrile copolymers, lower tensile strengths were shown by the copolymers of amyl, hexyl, n-octyl, and 2-ethylhexyl acrylates with acrylonitrile and by the butyl acrylate-methacrylonitrile copolymer. The hexyl acrylate-acrylonitrile copolymer, prepared by Redox polymerization, when loaded with Philblack O gave vulcanizates with tensile strengths as high as those of the butyl or ethyl acrylate copolymers. Thus, it appears evident that by suitable compounding these copolymers would produce vulcanizates with tensile strengths sufficiently high for many applications.

The tables show that the state of cure can be significantly altered by changes in the amine-sulfur ratio. In general, high amine concentrations resulted in vulcanizates with low elongations and fairly high hardness values. A minimal concentration of sulfur was necessary for the desired heat resistance; however, high sulfur concentrations apparently contributed little to the tensile properties of the vulcanizates. This is best illustrated by the vulcanizates of Copolymer No. 29 (Table VI). Vulcanizate J contained one part of triethylene tetramine and one part of sulfur. Holding the amine concentration to one part and increasing the sulfur concentration stepwise to 5 parts (Vulcanizates N, O, P, and Q) gave vulcanizates that had similar tensile properties.

Brittle Points of the Vulcanizates: The bend-brittle points of the green stocks (Tables IV to VII), were determined as described by previous investigators *(12)*. The brittle point was dependent on the polymer composition increasing with higher acrylonitrile content and decreasing with the copolymers of the higher acrylic esters. The ethyl acrylate-acrylonitrile vulcanizates had brittle points from +16° F. (for the copolymer prepared from a monomer mixture of 95 percent ethyl acrylate and 5 percent acrylonitrile) to about +30° F. (for the copolymer prepared with 10 percent acrylonitrile) (Copolymers 12, 13, Table VII).

The brittle points of the copolymers of the higher acrylates were lower but were dependent on the acrylonitrile content of the copolymer, which was largely dependent on the acrylonitrile content of the monomer charge and to a less extent on the polymerization conditions. For example, a copolymer prepared from 95 percent butyl acrylate and 5 percent acrylonitrile (Copolymer No. 1, Table V) had a brittle temperature of about —33° F. The copolymers from a monomer mixture of 87.5 percent butyl acrylate and 12.5 percent acrylonitrile (Table IV) had on the average brittle points of about —11° F. These values were fairly independent of state of cure. Occasionally samples prepared with this same monomer composition had substantially lower brittle points. Thus, Copolymer Nos. 9 and 11 (Table IV) had brittle points of approximately —25° F. Chemical analysis indicated that the percentage of nitrogen in these samples was somewhat lower than in the other batches. Other copolymers, which have been expressly prepared with the least rise in temperature, also showed lower nitrogen values and, therefore, lower brittle points.

These observations suggest that the chemical composition of the copolymer has a more pronounced effect on the brittle point than structural variations such as branching within the copolymers.

Heat Resistance Characteristics: The resistance of acrylic rubbers to dry heat is now well known. The stress-relaxation studies of Tobolsky and coworkers *(13)* showed that heat resistance is dependent on two reactions—cross-linking and chain scission—which may occur simultaneously. Heat resistance is therefore dependent on the rates of these competing reactions. With acrylic vulcanizates, the heat resistance is also dependent on the vulcanizing ingredients. Dietz et al *(3)* demonstrated the importance of the compounding ingredients in achieving maximum heat resistance.

Since the change in the tensile properties is rather small when the vulcanizates are exposed to dry heat at 300° F. for periods less than one week, they were exposed to higher temperatures to demonstrate the effects of the compounding ingredients and the various acrylic ester copolymers on the heat resistance. In this Laboratory, it is customary to evaluate the tensile properties of the vulcanizates that have been exposed to dry heat for 72 hours at 350° F. If the tensile strength does not materially change and the ultimate elongation is above 100 percent, the vulcanizate is considered to have good dry-heat resistance. This was used as a criterion in comparing the dry-heat resistance of the various acrylic rubbers studied in this investigation.

The heat resistance data presented in Tables IV, V, and VII show that the acrylic vulcanizates had good heat resistance. The tensile properties of the ethyl through hexyl acrylate-acrylonitrile copolymers demonstrated that the amine-sulfur recipe controls the properties of the aged vulcanizates. The higher the concentration of triethylene tetramine in the recipe the tighter was the initial state of cure and the state of cure in the aged samples. The best heat resistance was obtained with the lowest concentration of the triethylene tetramine. Previous studies showed that sulfur is essential for maximum heat resistance; only small concentrations are required, however, and high concentrations of sulfur in the recipe produce no significant improvement over the lower concentrations.

The octyl acrylate-acrylonitrile copolymers did not have as good heat resistance as the lower acrylate ester copolymers. The data in Table VI illustrate the excessive decrease in elongation on exposure to dry heat at 350° F. for 72 hours. Replacing part of the octyl acrylate with ethyl acrylate did not materially improve the heat resistance of the vulcanizates, as illustrated in Table VI, Copolymer 29. The composition of the monomer mixture was 60 percent n-octyl acrylate, 30 percent ethyl acrylate, and 10 percent acrylonitrile, and none of the recipes yielded a vulcanizate with the heat resistance of the lower acrylate-acrylonitrile vulcanizates.

Copolymer Nos. 15, 16, Table VII, show the heat resistance of copolymers of butyl acrylate and methacrylonitrile. The initial tensile strengths were not particularly high which perhaps may be attributed to the method of polymerization. The relatively low raw Mooney values of these copolymers suggest that a substantial amount of low molecular weight components were present, thereby lowering the viscosity of the copolymer and also affecting the tensile strengths of the vulcanizates. The heat resistance was exceptionally good, however, since elongations well above 100 percent

were obtained after exposure to 350° F. for 72 hours. Replacing the Furnex carbon black with Philblack O would substantially increase the initial tensile strengths of the vulcanizates, which would in all probability be retained on heat aging.

Heat-Aged Brittle Points: In recent years a great deal of emphasis has been placed on the low temperature characteristics of synthetic rubbers, and considerable effort has been devoted to obtaining elastomers with brittle points well below —70° F. The acrylic rubbers described in this paper did not have particularly low brittle points; however, the brittle points of the heat-aged vulcanizates were substantially the same as those of the green vulcanizates, on the average being higher by only about 10° F.

Tables IV, V, and VII list the brittle points for many of the stocks aged at 350° F. for 72 hours. Apparently the change in the brittle point on aging is a good criterion for heat resistance, since many of the vulcanizates that exhibited the greatest change in brittle points also showed poor heat resistance. In particular, the hexyl acrylate-acrylonitrile copolymer (Table VII, Copolymer No. 18) had a brittle point for the green vulcanizates of —49° F.; however, on aging the brittle point changed to —15° F. In addition, the elongation of the vulcanizates also changed markedly on aging.

Summary

Copolymers of various acrylic esters, from ethyl to octyl, with 5 to 15 percent acrylonitrile or methacrylonitrile, were prepared by refluxing emulsion polymerization and in two instances by "Redox" polymerization. These copolymers were easily vulcanized with sulfur and triethylene tetramine recipes.

Heat-resistant vulcanizates were obtained from the copolymers of acrylonitrile with ethyl, butyl, amyl, and hexyl acrylates and also from the copolymer of methacrylonitrile with butyl acrylate. The octyl acrylate-acrylonitrile copolymers and the octyl acrylate, ethyl acrylate, and acrylonitrile terpolymers did not show similar heat resistance. Terpolymers obtained from ethyl acrylate, butyl acrylate, and acrylonitrile, however, produced heat-resistant vulcanizates.

The vulcanizates of lowest brittle points were obtained from the copolymers of the higher acrylic esters, but regardless of the acrylic ester used, the brittle point was considerably increased with increasing acrylonitrile content of the copolymer. The copolymers from 95 percent amyl acrylate—5 per cent acrylonitrile and the copolymer of 91 percent hexyl acrylate—9 percent acrylonitrile showed brittle points of —45° and —49° F., respectively. In general the brittle point of heat-resistant stocks did not change by more than approximately 10° F. on heat-aging for 72 hours at 350° F.

The butyl acrylate-methacrylonitrile copolymer appeared to have somewhat better heat-aging properties than did the butyl acrylate-acrylonitrile copolymer.

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Reconditioning of Tank Roadwheels and Tracks

THE completion of a pilot plant for the reconditioning and retreading of tank roadwheels and tracks was recently announced by the Rubber Branch of the Detroit Arsenal at Center Line, Mich. W. D. England is chief of the branch. It is estimated that operation of the new pilot plant and others like it will save the American taxpayer more than $6,000,000 a year.

The life expectancy of new roadwheels and tracks is approximately 2,500 miles. In the past it has been necessary to discard equipment that had travelled this distance. The reason for this was that the wheels were so worn and warped during this period that they could not be resurfaced with rubber. There were no molds available flexible enough to absorb the irregularities of the used wheels.

At the same time, the guide flange on the used road wheels was found to be so worn as to render the wheel unsatisfactory for continued service. A special rapid welding and machining process was developed to overcome this difficulty. New guide flanges are built up by dropping molten metal on the prepared wheel surface, then machined to the required size.

Two distinct stages are involved in processing the wheels for reuse. First, the wheel itself is reconditioned, then the new tire is put on. To complete the second phase, new molds and presses, made of rolled steel rather than castings, were designed which were flexible enough to absorb the irregularities of the warped wheels. Each wheel salvaged in this plant means an immediate saving to the government of $40.00. The reconditioned wheels have a greater life expectancy than new wheels.

An eight-man crew, working a forty-hour week, will be able to recondition between 430 and 440 wheels each week. It is estimated that during times of emergency, annual savings will amount to $27,000,000 and more than 28,000 tons of steel. Supply problems will be greatly simplified and it will not be necessary to maintain depot stocks at their present level. Facilities currently used for shipping and storing roadwheels will be available for other equipment.

Practical Neoprene Compounds of Low Elastomer Content

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IT is common practice in compounding all elastomers to extend them with fillers and softeners to the highest degree commensurate with satisfactory performance. Catton et al *(1)* have shown that the addition of fillers to neoprene has less adverse effect on many vulcanizate properties than is the case with other elastomers. These facts indicated the possibility of developing competitive neoprene compounds which would extend the market for products in which the superior properties of neoprene are desired.

In the past, processing requirements have limited the degree to which neoprene stocks could be extended by fillers and softeners, irrespective of the limitations imposed by vulcanizate quality. It has been found that Neoprene Types W and WRT are more suitable for compounding stocks of low elastomer content than the earlier types. They resist mechanical breakdown to a greater degree than the sulfur-modified types of neoprene and so when mixed with large amounts of filler and softener are less apt to give stocks which are unmanageably sticky, mushy or putty-like. The tensile strength and resistance to compression set of conventionally loaded Neoprene Type W and WRT vulcanizates are superior to those of the sulfur-modified types and the same relative advantages are maintained in highly loaded stocks.

Some of the compounds discussed in this paper contain less than 30 percent by volume of neoprene as total elastomer. Except for very hard compositions, neoprene of higher than normal viscosity generally must be used, otherwise the uncured stocks are apt to be too soft and sticky for practical factory operation. Generally, the lower the hardness of the vulcanizate or the lower the elastomer content, the higher should be the viscosity of the polymer.

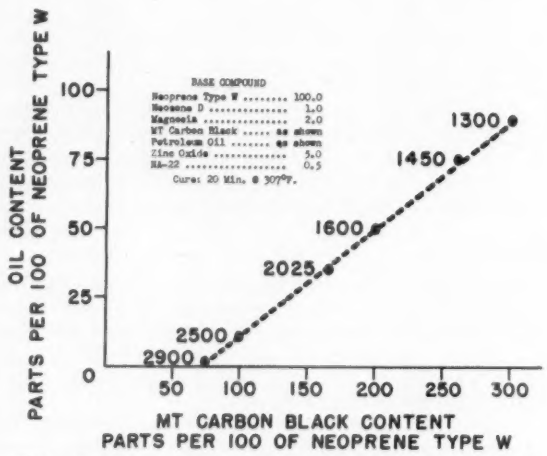

FIG. 1—Quantities of MT carbon black and oil required for 60 durometer Neoprene Type W compounds of various tensile strength.

TABLE I—COMPARISON OF PHYSICAL PROPERTIES OF VULCANIZATES PREPARED FROM NEOPRENE TYPE W OF DIFFERENT PLASTICITY GRADES

Neoprene Type W (50 Mooney)	100.0	—
Neoprene Type W (100 Mooney)	—	100.0
Neozone A	2.0	2.0
Magnesia	4.0	4.0
MT Carbon Black	225.0	225.0
Sovaloid N	50.0	50.0
Zinc Oxide	5.0	5.0
NA-22	0.5	0.5
(Cure: 20 min. @ 307° F.)		
Stress at 200% Elongation, psi	1125	1150
Tensile Strength, psi	1500	1500
Elongation at Break, %	310	300
Durometer Hardness	66	65
Compression Set, %—Method B		
22 Hours at 158° F.	26	27
70 Hours at 212° F.	62	61
Yerzley Resilience, %	47	48
Volume Change, %		
70 Hrs. at 212° F. in ASTM Oil No. 3	40	37
Brittle Temperature, ° F.	—40	—38

The physical properties of the vulcanizate are not dependent on the plasticity of the Neoprene Type W used. Table I shows two highly extended compounds having the same formula except for the plasticity of the neoprene. The results of several physical tests are shown and it will be observed that the values for each compound are in agreement within experimental error.

Neoprene Types W and WRT of high viscosity even though tough can be compounded on a mill. Internal mixing methods are preferred, however, because with the type of compounds discussed the time required to incorporate the inordinately high quantities of fillers and softeners on open mills is long. If the proper plasticity grade Neoprene Type W is selected, the mixed compounds will be firm yet free from nerve. They may be calendered, extruded and molded easily and will resist deformation both before and during cure.

Selection of Processing Oils

In compounding for any specific application, the hardness of the vulcanizate is an important consideration. Naturally, in compounding with high amounts of filler,

Table II—Effects of Various Petroleum Base Plasticizers

BASE COMPOUND

Neoprene Type W (100 Mooney)	100.0
Neozone D	1.0
Magnesia	2.0
MT Carbon Black	100.0
SRF Carbon Black	150.0
Stearic Acid	0.5
Petrolatum	2.0
Paraffin	2.0
Plasticizer (As Shown)	75.0
Zinc Oxide	5.0
NA-22	0.5

	Sundex 53 (1)	S/V Sovaloid N (2)	S/V Sovaloid W (3)*	Indonex 633½ (4)	Indonex 637½ (5)	Indonex W-2 (6)	Shell SPX-97 (7)	Dutrex 20 (8)	Dutrex 7 (9)	GB Light Process Oil (10)	GB Medium Process Oil (11)	Califlux GP (12)
Internal Mixing Data												
Banbury "00" Size												
Dump Temperature, ° F.	180	200	180	230	190	180	190	210	Not Determined			210
Mixing Time, minutes	8.5	8.5	9.0	7.5	9.5	9.5	8.0	7.5	7.5	7.5	7.5	8.5
Sticking	None	None	None	None	Sl.	Sl.	V. Sl.	V. Sl.	Sl.	None	None	None
Remarks	——	Fumed	——	——	Stiff	——	——	——	——	Fumed	Fumed	——
Williams Plasticity-Recovery at 176° F.	220–39	283–81	248–37	267–84	272–68	227–55	266–80	345–129	280–95	212–42	232–98	324–127
	Cure: 20 Mins. @ 307° F.											
Mooney Viscosity at 250° F. (Compound) Minimum Value	25	33	27	33	29	21	32	54	34	21	26	36
Mooney Scorch at 250° F. Minutes to 10 Point Rise	24	16	16	19	14	14	14	17	14	14	15	14
Specific Gravity (Determined)	1.46	1.48	1.47	1.47	1.48	1.46	1.47	1.49	1.48	1.46	1.47	1.48
Original Properties												
Tensile Strength, psi	1375	1350	1400	1375	1675	1425	1350	1700	1550	1350	1350	1675
Elongation at Break, %	150	230	180	170	180	200	160	170	180	160	170	200
Durometer Hardness	75	68	75	69	75	66	72	75	68	76	70	70
Oven Aged—70 Hours at 212° F.												
Tensile Strength, psi	1375	1450	1425	1375	1500	1275	1400	1625	1475	1600	1575	1475
Elongation at Break, %	140	140	160	170	170	170	150	150	180	90	120	160
Durometer Hardness	89	95	90	75	79	89	80	75	76	85	95	85
Oil Aged—ASTM Oil No. 3, 70 Hours at 212° F.												
Tensile Strength, psi	1275	1175	1325	1375	1325	1275	1350	1500	1425	1375	1325	1375
Elongation at Break, %	140	210	190	170	160	170	160	140	170	170	170	150
Durometer Hardness	53	45	50	50	52	50	50	50	50	53	50	50
Volume Change, %	+25	+32	+31	+26	+29	+27	+26	+26	+27	+25	+27	+26
Oil Aged—ASTM Oil No. 1, 70 Hours at 212° F.												
Volume Change, %	— 9	—12	— 7	—11	— 9	—11	—10	—11	—12	—10	—12	—11
Compression Set—Method B												
22 Hours at 158° F.	17	18	20	17	15	15	14	13	14	13	13	15
70 Hours at 212° F.	46	54	47	38	39	48	42	36	41	40	41	39
Yerzley Resilience, %	25	23	21	24	20	25	24	26	25	29	26	26
Brittle Temperature, ASTM D746, ° F.	—38	—38	—33	—38	—27	—38	—38	—22	—27	—38	—27	—33
Relative Ozone Resistance—25% Elongation 15 Minutes at 100 parts per million	4**	1	0	3	2	1	0	2	3	10	8	4
Durometer Hardness at 32° F.												
After 1 Day	80	80	85	80	80	80	80	85	80	80	80	80
After 7 Days	83	82	90	85	80	80	82	85	80	81	80	85
After 14 Days	90	85	90	85	85	85	90	90	85	85	85	90

Notes on manufacturers and shipping points: (1) Sun Oil Co., Marcus Hook, Penna. (2, 3) Socony-Vacuum Oil Co., Paulsboro, N. J. (4, 5) Indoil Chemical Co., Wood River, Ill. (6) Indoil Chemical Co., Whiting, Ind. (7) Shell Oil Co., Houston, Texas. (8) Shell Oil Co., Martinez, Calif. (9) Shell Oil Co., Wood River, Ill. (10, 11, 12) Golden Bear Oil Co., Oildale, Calif.

(*) S/V Sovaloid W was not compatible in this amount and bloomed from the vulcanizates.

(**) Rating based on arbitrary scale of from 0 = no cracks to 10 = broken.

correspondingly high quantities of softener must be included not only to adjust hardness but to render the stock processable. With MT carbon black the ratio of black to oil which must be employed to maintain equivalent hardness at various loading levels is shown in Figure 1. A straight line was obtained by plotting the amount of MT carbon black against the amount of oil required to produce a Neoprene Type W vulcanizate of 60 durometer hardness. The figures shown at various points along the line are the tensile strength values obtained for the compositions indicated.

Many commonly used petroleum base process oils are not compatible with neoprene in the amounts required for very high loading, especially in the case of soft or medium hard vulcanizates which require a high ratio of oil to filler. If used in excess of their compatability limit in a particular compound, they will exude to the surface of the uncured stock or the vulcanizates. Certain esters and vegetable oil derivatives may have a high degree of compatibility but are too costly to warrant their use as plasticizers in compounds designed for highly competitive products. Fortunately, a number of low cost petroleum fluids which are compatible in large amounts with neoprene are commercially available and have been found ideal for this type of compounding. These fluids may be described as extracts of petroleum distillates containing a substantial amount of those materials commonly termed aromatics by the petroleum industry.

To be compatible at the upper limit studied—100 parts per 100 of neoprene—the aromatic content of an oil must be about 75 percent. This figure will vary somewhat with the average molecular weight of the oil because for a given aromatic content, the lower the molecular weight the higher the degree of compatibility. The saturated components of the oil should be predominantly naphthenic though a small percentage of paraffins may be present. Paraffin wax is compatible in neoprene only to a very limited degree so it is recommended that oils for general use be relatively free from high molecular weight straight chain paraffins. Asphaltene-containing products have proven valuable in compounding neoprene, particularly for resistance to crystallization *(2)*. It is recommended, however, that oils used in the type of compounds discussed in this paper be relatively free from asphaltenes because in highly loaded stocks they tend to give leathery feeling vulcanizates of low tensile strength.

The oils studied have varied considerably in viscosity. Viscosity is dependent on the average molecular weight of the components of the oil as well as its type of composition. The more viscous oils studied in Neoprene Type W appear to be less efficient as softeners, resulting in firmer uncured stocks and vulcanizates of higher durometer. Resistance to heat aging as measured by hardness increase and ultimate elongation loss is excellent, probably due to the low volatility of such viscous oils. Low temperature properties of vulcanizates containing the lower molecular weight oils are better, however.

The compounder has a wide variety of oils from which to choose and the selection may best be based on processing requirements specific to the product and particular factory conditions as well as the desired vulcanizate properties. Cost also influences the selection of oils for this type of compound. While oils of similar grade generally are competitive in price FOB source of manufacture, transportation charges may amount to a considerable percentage of the delivered cost and so favor the selection of an oil manufactured in an area convenient to the rubber factory.

Some of these oils which are highly compatible with neoprene have been compared. The processing and vulcanizate properties of highly loaded Neoprene Type W compounds containing 75 parts of various oils are shown in Table II. Manufacturer's name and point of manufacture are indicated for each oil. The data shown will enable the compounder to select the type of oil best suited to meet his particular compounding requirements.

Evaluation of Carbon Blacks

Neoprene vulcanizates containing carbon black loading have been shown to have better general mechanical properties than those containing mineral fillers *(3)*. This is especially true in the case of resilience, heat build-up and resistance to set. In the majority of highly competitive products wherein the superior properties of neoprene are desirable, black color meets with little objection. These facts prompted an early evaluation of various types of carbon black as loading.

It was found that in these highly loaded stocks the use of those blacks considered relatively low in reinforcing power resulted in better vulcanizates than the finer particle sized more reinforcing types. This is all the more outstanding when it is observed that the comparison was made at equivalent hardness and the neoprene content of the stocks containing the reinforcing carbon black was necessarily higher than those containing carbon black of larger particle size.

Table III shows a comparison of MT, SRF, GPF and HAF carbon blacks in Neoprene Type W compounds having vulcanizate hardness values of about 60 durometer. It will be noted that notwithstanding the lower elastomer content of the MT carbon black compound, in general it had the best physical properties, though SRF carbon black rated a close second. The "hard" carbon blacks had a great stiffening effect on the stock, and in the case of the HAF type the plasticity of the mixed stock was such that processing was difficult. Had Neoprene Type W of standard Mooney viscosity been used in this compound, the stock probably would have been more easily processed. The moderate degree of stiffness imparted by SRF carbon black and the good physical properties it produced suggested its use in combinations with MT carbon black to render stocks practical for specific manufacturing processes.

The vulcanizates containing GPF and HAF carbon blacks bloomed oil shortly after cure. This indicated that the oil was not truly compatible in the amount used (100 parts) but in the case of the MT and SRF carbon black loaded stocks no blooming resulted probably because the greater amount of filler employed held the oil mechanically within the vulcanizate. This is an important point which emphasizes the caution which must be exercised in selecting the amount and type of oil to be used.

Vulcanizate Properties

In reviewing the data for vulcanizate properties shown in Table II and Table III, it is apparent that tensile strength and elongation values in all cases are of the order of magnitude generally considered acceptable for the majority of mechanical goods applications involving competitive grade products. With many of the oils, heat resistance is remarkably good. Oil resistance measured by the effect of aging in oil on both stress-strain values and volume change is outstanding. Because of the low elastomer content of most of these stocks, oil swelling values are not unlike those found with many conventionally compounded low-swell elastomers. Resilience, while low when compared with conventional neoprene compounds, compares favorably with that of most other synthetic elastomers. Compression set resistance both at 158°F. and 212°F. is superior to that of most

TABLE III—EFFECT OF DIFFERENT CARBON BLACKS

Neoprene Type W	100.0	100.0	100.0	100.0
Neozone D	1.0	1.0	1.0	1.0
Stearic Acid	0.5	0.5	0.5	0.5
Petrolatum	1.0	1.0	1.0	1.0
Paraffin	2.0	2.0	2.0	2.0
Magnesia	2.0	2.0	2.0	2.0
MT Carbon Black	300.0	—	—	—
SRF Carbon Black	—	200.0	—	—
GPF Carbon Black	—	—	175.0	—
HAF Carbon Black	—	—	—	125.0
Sundex 53	90.0	100.0	100.0	100.0
Zinc Oxide	5.0	5.0	5.0	5.0
NA-22	0.5	0.5	0.5	0.5
Williams Plasticity-Recovery	96–5	273–86	241–64	303–123
(Cure: 20 min. @ 307° F.)				
Original Physical Properties				
Stress at 100% Elongation, psi	275	650	375	325
Stress at 200% Elongation, psi	825	1150	675	850
Tensile Strength, psi	1325	1275	975	1100
Elongation at Break, %	280	220	280	280
Hardness, Durometer	57	58	57	55
Yerzley Resilience, %	40	24	24	30
ASTM Compression Set—% Method B—30% Deflection				
22 hours at 158° F.	35	40	64	52
70 hours at 212° F.	70	76	83	77
Aged 70 Hours in 212° F. Oven				
Stress at 100% Elongation, psi	500	850	675	675
Stress at 200% Elongation, psi	1025	1400	1200	1200
Tensile Strength, psi	1225	1400	1200	1250
Elongation at Break, %	240	200	200	220
Hardness, Durometer	70	76	78	70
Immersed in ASTM Oil No. 3 for 70 Hours at 212° F.				
Stress at 100% Elongation, psi	225	450	325	275
Stress at 200% Elongation, psi	1025	1125	875	850
Tensile Strength, psi	1075	1200	1025	925
Elongation at Break, %	260	220	220	220
Hardness, Durometer	40	47	41	41
Volume Change, %	24	23	27	27

high quality Neoprene Type GN vulcanizates. Brittle temperature will vary with the amount and type of oil used. Some oils impart moderately good low temperature properties and these properties may be improved by the simple substitution of those ester type plasticizers commonly used for this purpose for some of the oil.

The adverse effect of large amounts of filler and softener on the ozone resistance of neoprene vulcanizates has been reported *(4, 5)*. Therefore, it was not surprising to find that unprotected stocks of this type fail prematurely in the ozone cabinet. Ozone cracking also occurs on outdoor exposure. Conventional neoprene compounds even though unprotected will not ozone crack on prolonged outdoor exposure. Waxes and certain antioxidants, if used in greater than normal amounts, are effective agents for inhibiting the attack of neoprene by ozone. For highly loaded compounds subject to outdoor exposure or use in proximity to a source of ozone, the addition, based on the neoprene, of 2 to 5 parts of paraffin wax and 3 to 5 parts of a suitable antioxidant is recommended. Thermoflex A, Akroflex C, BLE, Aminox, Santoflex AW and Antox have been found to be effective as judged by resistance to ozone cracking of samples exposed outdoors for four months. Many antioxidants are either ineffective or actually deleterious to ozone resistance, so careful selection is mandatory.

Neoprene Type W compounds tend to stiffen when exposed to moderately low temperatures. This is caused by crystallization of the polymer and is a reversible effect. The effect of crystallization on these low elastomer compounds has been found to be relatively slight. In many cases, vulcanizates exposed for long periods at the optimum temperature for crystallization (approximately 32°F.) have increased in durometer hardness only 10 points. Where the ultimate in resistance to this type of stiffening is required, however, Neoprene Type WRT should be used. Although this article shows test data only for Neoprene Type W compounds, the values apply closely to the same compounds based on Neoprene Type WRT.

Practical Application

The practical application of the low cost compounding techniques described herein may require minor modifications of the formulas already shown. For example, the need for selecting special antioxidants in certain cases already has been discussed. Lubricants, such as stearic acid and petrolatum, must be adjusted to control sticking during processing. The curing system may be altered to suit specific needs. The development of a compound for low cost automotive coolant hose tubes illustrates the

TABLE IV—COMPETITIVE NEOPRENE RADIATOR HOSE TUBE COMPOUND

Neoprene Type W (100 Mooney)	100.	
Stearic Acid	0.5	
Petrolatum	1.	
Paraffin	2.	
Neozone D	1.	
Magnesia	2.	
SRF Carbon Black	150.	
MT Carbon Black	50.	
Hard Clay	50.	
Sundex 53	65.	
Mineral Rubber	15.	
Zinc Oxide	3.	
NA-22	0.5	
(Cure: 20 min. @ 307° F.)		SAE 20R Coolant System Hose Specification Part IV, Class SC
Original Physical Properties		
Hardness, Durometer	71	60-80
Tensile Strength, psi	1200	1000 Min.
Elongation at Break, %	275	200 Min.
Specific Gravity	1.48	
Aged in Air Oven for 70 Hrs. at 212° F.		
Hardness, Points Change	+ 7	0 to 20
Tensile Strength, % Change	— 2	—15 Max.
Elongation at Break, % Change	—33	—50 Max.
Aged in ASTM Oil No. 3 for 70 Hrs. at 212° F.		
Hardness, Points Change	—34	—
Tensile Strength, % Change	— 2	—60 Max.
Elongation at Break, % Change	—25	—
Volume Change, %	+35	+50 to +100
Aged in Coolant for 70 Hrs. at Boiling Point*		
Hardness, Points Change	0	—
Tensile Strength, % Change	0	—30 Max.
Elongation at Break, % Change	—10	—
Volume Change, %	+ 6	0 to +35
ASTM D736-44T Cold Test for 5 Hrs. at —40° F.	OK	No Cracks

(*) 1/3 by volume water, alcohol and ethylene glycol.

adaptation of a highly extended compound through modification to fit both processing and vulcanizate requirements. A formula found highly suitable for automotive radiator hose tubes is shown in Table IV. Applicable test data are included.

The selection of the amount and type of the various ingredients used was based on a consideration of practical factory processing requirements and the necessity that the product pass consumers' specifications. The purpose of using high viscosity Neoprene Type W already has been discussed. All neoprene vulcanizates must contain antioxidants to meet aging standards. One part of Neozone D was found to provide the minimum acceptable degree of protection in this product at low cost. Petrolatum, stearic acid and paraffin were included to prevent sticking to the rotors of the mixer or to the mill rolls and to act as extrusion aids.

Because a durometer hardness of 70 was required, SRF carbon black was selected as the principal loading material. SRF carbon black-loaded neoprene vulcanizates have rather low ultimate elongation and because of specification limitations on the finished product in this respect, it could not be used as the sole loading material. MT carbon black and clay were used as additional filler loading. Clay not only provided good elongation values but gave increased firmness to the uncured stock preparation. If more than 50 parts were used, however, sticking resulted so MT carbon black was used to fill out the balance of the loading required to render the compound material cost competitive with other compositions used in this product. The oil used as a plasticizer in this compound was Sundex 53. Many other petroleum extracts like those shown in Table II would serve as well for this purpose.

A thermoplastic extender, such as mineral rubber, was found a desirable additive in order to insure sufficient uncured stiffness to allow for the braiding of a fabric reinforcement over the hose tube. Being thermoplastic, the stiffening effect at room temperature was not evident at the temperatures reached during processing so it did not contribute to internal friction when mixed and extruded.

The curing system used—magnesia, 2 parts; zinc oxide, 3 parts; NA-22, 0.5 part—might normally be considered too rapid for safe handling in many factories. Highly extended compounds of this type, however, have a slower rate of cure and such a combination has been found adequately safe from the standpoint of scorch.

The data in Table IV show that this compound meets the requirements of SAE 20R Coolant System Hose Specification, Part IV, Class SC, with the exception that its volume change in hot oil is less than the lower limit specified. Few would consider this as other than a desirable deviation. By virtue of the high degree of extension, resistance to hot coolant mixtures is superior to conventionally loaded neoprene compounds which are well recognized as preferred for coolant hose service. Practical service tests have confirmed laboratory data. Excellent performance has been reported for radiator hose made with highly extended neoprene compounds in the tubes.

The compounding principles discussed in this paper and exemplified by the practical hose tube formulation are applicable to many other products. The use of neoprene in many competitive items from which it has been excluded previously should result in improved products and increased utility to the ultimate consumer.

Summary

Neoprene Types W and WRT of high viscosity are useful in compounding for products wherein quality and cost strike a delicate balance.

Inordinately large quantities of the proper types of filler and softeners may be used, yet the stocks are easily processed and the vulcanizates have remarkably good physical properties.

Certain low cost petroleum fluids which are highly compatible with neoprene have been found to be excellent plasticizers for this type of compound.

Fillers of the non- or semi-reinforcing type are preferred as loading.

Antoxidants are essential ingredients, especially for resistance to ozone.

The practical application of these principles in compounding a competitive neoprene radiator hose tube has been demonstrated.

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Wire-Braid Rubber Hose Replaces Rigid Metal Pipes

IN the manufacture of rubber conveyor belts at the Thermoid Company, Trenton, N. J., curing takes place in long presses. Hydraulic pressure is applied to the belts by 12 pistons which are actuated by water under 2200 psi from a long metal standpipe. Formerly, the individual pistons were connected to the standpipe by rigid metal pipes operating through a 90° bend. Vibration caused continuous breakage of the 12 connecting pipes with loss of production and high maintenance costs.

Thermoid licked this problem by using another of their own products: high pressure powerflex hydraulic wire-braid hose. The 12 rigidly connected pipes were replaced by 12 short lengths (about 15 inches long) of hydraulic hose which take a 90° bend. The hose is built to stand the pressures involved and yet is flexible enough to absorb the vibration which is caused by pulsations from the hydraulic pump as the pistons raise the bottom half of the press against the top.

The hydraulic hose connections have been used for four years and are still going strong. Loss of production has stopped and no maintenance has been necessary since the hose was installed.

Editorials . . . . . .

Ceylon's Decision

THE RECENT decision of the Ceylonese government to conclude an agreement with Communist China under which it will supply that country with 250,000 long tons of natural rubber in the next five years came as somewhat a surprise to the other free nations of the world. The decision was on the paradoxical side, since the Ceylonese Government is headed by anti-communists. It should be emphasized, however, that while Ceylon is still in the British orbit, it recently secured full independence, and as an independent republic it has the right to make its own final decisions despite the general feeling and actions of other nations in the British Commonwealth.

Some light on the background of the Ceylonese deal was shed by W. Averell Harriman on his retirement as Director for Mutual Security. According to Mr. Harriman, Ceylon spurned an offer from the United States to buy its rubber at existing world market prices and negotiated the deal with Communist China which offered a premium of 40 percent above such prices. Further, as part of its condition for selling its rubber to the United States, Ceylon insisted on a $50,000,000 economic aid program over the next five years, a deal which the Mutual Security Agency hesitated to offer.

As in many negotiations involving nations in Southeast Asia, rice played an important role in the final agreement. Ceylon's population of some 7,000,000 is heavily dependent on rice as a food staple, most of it being imported. The final agreement requires Communist China to furnish Ceylon with 270,000 tons of rice annually during the life of the agreement. According to Mr. Harriman, the United States also offered to supply similar quantities of rice to Ceylon, but the price involved was not satisfactory to the government. Although the actual price involved has not been publicized, it may be assumed that the price offered by Communist China was considerably lower than that by the United States.

It should be quite obvious from the above paragraphs that the Ceylonese Government was indulging in "horse-trading" and Communist China won out over the United States. We are not so certain that Ceylon has made too good a deal, although the country should not be condemned or too heavily criticized for its final decision in this instance. Ceylon is a young and struggling republic, and like all such new republics it will make mistakes, the seriousness of which only history can tell. We believe that it has made a mistake in the current instance from a long range viewpoint even though the agreement will bring short range benefits to the Ceylonese people. Modern history has already proved that there is no compromise with communism.

From the standpoint of Communist China, there can be little doubt that the negotiations with Ceylon had a double purpose: (1) To obtain natural rubber denied to her because of the embargo maintained by the United Nations (of which Ceylon is not a member), and (2) For the sake of the political and propaganda value which the trade agreement will bear in Southeast Asia. The Cominform will lose little time in broadcasting news of the five-year agreement to all of the peoples of Malaya, Indonesia, Indo-China, and the other nations.

More on Buffer Stocks

AS PREVIOUSLY reported in these columns, the "working party" established by the International Rubber Study Group at its 1952 meeting in Ottawa, Canada, has been holding a series of meetings to prepare a plan to "stabilize" prices of both natural and synthetic rubber. Although no official announcement was made following the mid-1952 meeting of the "working party" in London, it was generally understood that a buffer stock arrangement had been discussed and was being referred to member governments for consideration.

The "working party" has just concluded another meeting, again held in London, and this time an official statement has been issued which reveals that the group has "decided to concentrate on the buffer stock type of agreement" and further that it "has prepared a draft of such an agreement for the consideration of the International Rubber Study Group." The next meeting of the full group will be held in May in Copenhagen, Denmark.

No details of the proposed stabilizing mechanism have been revealed but obviously a number of questions remain to be solved before any scheme remotely resembling practicality could be evolved. Chief among these are: where would the millions of dollars required to operate buffer stocks come from and how could synthetic rubber production be controlled, particularly if such production were in private hands as it may be shortly. It may be presumed that the "working party" has some answers to these questions, but it is doubtful that the answers would sit well with the American public.

NEWS OF THE MONTH

RFC REACTIVATES ADDITIONAL COPOLYMER LINE AS GOODYEAR ANNOUNCES NEW TYPE SYNTHETIC

TOP news in the rubber industry during the last month came from the Reconstruction Finance Corporation which ordered the reactivation of an additional copolymer line at the Institute, West Va., plant, and from the Goodyear Tire & Rubber Co. which announced that it had received basic patents on an entirely new type of synthetic rubber similar to the German "Vulcollan". Reopening of the Institute unit will make possible the production of another 3,500 long tons of GR-S each month. Announced on January 23, engineers estimated that the unit could be in operation within 30 days. Two recently reactivated alcohol units at the RFC plant at Kotuba, Penna., already are producing butadiene, and two others at Louisville, Ky., are scheduled to resume operations within the next few months. The Institute plant is operated for RFC by the B. F. Goodrich Chemical Co., a division of the B. F. Goodrich Co.

The Goodyear announcement came from P. W. Litchfield, chairman of the board, who stated that secret work on the program had been under way for several years. The scientific work leading up to the issuance of the patents was conducted under the direction of R. P. Dinsmore, Goodyear vice-president in charge of research and development.

Dr. Dinsmore explained that the new type of rubber is chemically similar to Germany's recently-announced Vulcollan, developed by the German scientist Dr. Otto Bayer, but that it offers important processing advantages over the German product. Vulcollan, he said, must be molded into the finished product immediately after it is chemically composed, while the new Goodyear rubber provides a "reaction factor" which makes possible delayed processing on conventional rubber machinery. Thus, while Vulcollan is suitable for a limited class of products, such as soles and heels, the Goodyear synthetic has a wider range of uses and can be used for tires and conveyor belts.

Offers Wear Resistance

Dr. Dinsmore disclosed that tests of the Goodyear material show tire treads of this rubber achieve from two to five times greater wear resistance than treads of the best "cold" rubber produced. It is equivalent to Butyl rubber in air diffusion resistance, and is equivalent to neoprene in oil resistance. Its resistance to oxidation, he said, is far superior to natural rubber or to any other synthetic rubber.

Tensile strength is described as 50 to 100 per cent better than any other types of rubberlike material. Vulcanization time on tires made of this material, he said, can be slashed more than in half. In addition, it can be produced in every color of the rainbow without losing any of its utility. Goodyear's product is likened to a gelatin dessert made by a housewife in her own kitchen. Production (in open vessels) is almost that simple, as the raw rubber product solidifies much like the home-made delicacy.

Butadiene and styrene, component parts of the nation's major supply of synthetic rubber, have no place in the production of the new polyester material, Dr. Dinsmore said. Basic ingredients, ethylene glycol and propylene glycol, are mixed with adipic acid (derived from corn cobs, but obtained commercially from a petroleum source for use as an intermediate in the production of nylon). The resultant chemical is the polyester base of the new rubber. This polyester may be described as a molecular structure resembling an endless string of boxcars with couplings at each end, which interlock with the next in the string.

The polyester is treated with an amount of diisocyanate as determined by Goodyear's "reaction factor." This "R" factor, wherein lies Goodyear's secret of development, stops the solidifying reaction of the two chemicals at a point where the resultant material can be further processed on mills, calenders, extruders, etc.

When needed in production, the Goodyear rubber is given another diisocyanate treatment and formed into final shape without the use of sulfur or accelerators for vulcanization. Carbon black and other reinforcing agents may be used, although not required as a stock-toughening material.

First reports on Vulcollan had elicited enthusiastic response from Akron rubber scientists. Dr. Waldo L. Semon, director of pioneering research for the B. F. Goodrich Co., stated that Vulcollan was so good it could revolutionize the entire synthetic rubber-making and consuming industries.

The only impediment, it appeared, was the question of cost of the German product. The foreign rubber is said to cost about ten times the current price of GR-S. Dr. Semon opined that with modern production methods this cost could be cut to two or three times that of GR-S.

While the exact process for making Vulcollan is closely guarded by the Farbenfabrik Bayer firm, American scientists know it is made from something like this: From coal is extracted a coal tar, and from the tar benzol is separated. To it hydrogen is added, and the result is burned until it becomes adipic acid. This is treated with ethylene glycol. The compound is then treated with napthalene-diisocyanate, and the result is Vulcollan.

Synthetic Rubber Shortages

What with new developments in the field and the reopening of additional copolymer lines, the fact remains that some shortages in synthetic rubber have begun to crop up. This has come about due to the acceleration of the aviation gasoline program for military aircraft. Butylene finds use in both "Avgas" and as a source of butadiene. With greater demands coming from the military for aviation gasoline, RFC has had to turn to alcohol-butadiene to bolster the synthetic rubber program.

To this end, RFC recently announced the purchase of approximately 15,000,000 gallons of alcohol from three suppliers—Eastman Chemical Products, Enjay and Publicker Industries—who will furnish approximately 5,000,000 gallons each. Deliveries will be made at the rate of 5,000,000 gallons per month during February, March and April to the Louisville or Kobuta plants.

RFC also ended another phase of its activities with the presentation of a check for $25,000,000 to the U. S. Treasury, representing proceeds from its production programs and liquidation of wartime activities. The production programs encompassed national security measures for the manufacture of synthetic rubber and two other commodities.

One of ex-President Truman's last acts was to ask the Congress, in his budget message, that the United States continue its

operations in just these fields. Mr. Truman called for 735,000 tons of synthetic rubber in fiscal year 1954. He estimated that 660,000 tons would actually be produced in fiscal 1953, and that this production would bring a profit from sales to the consuming industry of about $43,000,000. He estimated costs would be $333,589,000 against income of $392,388,000 in fiscal 1954, for a profit of about $60,000,000.

Mr. Truman told Congress that the government planned to invest about $30,000,000 during fiscal 1954 for the basic purpose of attaining sufficient low-cost petroleum-butadiene capacity to produce 860,000 tons of GR-S annually.

With regard to increases in synthetic rubber production, it was recently announced that the five synthetic rubber plants in Texas were in the process of completing a conversion program to increase capacity of cold rubber producing facilities. The five plants will have a total production capacity of 385,200 tons per year of which only 48,000 will be "hot" rubber. The plants involved are the Goodrich-operated plant at Port Neches, the U. S. Rubber plant at Port Neches, the General Tire plant at Baytown, the Goodyear plant at Houston, and the Phillips plant at Borger.

In order to still further increase the production of GR-S, RFC, on February 1, announced that all oil and oil-black masterbatch polymers will be produced to a bound styrene content of 23.5%, plus or minus 1%, instead of the previous 20%, plus or minus 1%. New "X" numbers have been issued reflecting the complete list of active oil and oil-black masterbatch polymers effective with production on February 1, 1953.

Increasing Interest Reported

RFC has also reported that during recent months there has been a marked increase in interest in 37.5 parts oil masterbatch polymers, with the result that, although the interchangeability of the presently used oils has not been attained at the 25 parts level, it appeared advisable to add polymers of higher oil content to its present line.

Accordingly, new oil-masterbatch polymers will be produced at the 37.5 parts level with both rosin and acid soap and 50/50 mixed soap standard emulsifications. With respect to those polymers which contain aromatic oils, in order to avoid shipment of polymers which incorporate West Coast oils to plants located east of the Rockies, "Philrich 5" has been added to the line at the 37.5 parts level.

RFC states that it is generally agreed that Circosol 2XH is not interchangeable with other oils in the program. However, it is the only oil in the group that is relatively non-staining and non-discoloring. Therefore, RFC plans to confine the use of Circosol 2XH to those polymers which incorporate non-staining stabilizers. For example, polymers such as X-738 and X-747 will be discontinued as soon as practicable.

Although there is some interest in 50 parts oil-masterbatch polymers, industry's experience with X-709 and X-721, plus the impracticability of producing a large number of polymers, has prompted RFC to exclude such polymers from its line until the interchangeability of the indicated oils and consolidation of most of the "X" numbers at the 37.5 parts and 25 parts level has been accomplished.

Companies Offer Cooperation

RFC states that it has had excellent cooperation from all companies with regard to establishing the interchangeability of various oils. Certain companies, however, have stated that their inability to obtain these polymers in time has delayed their efforts to establish interchangeability. It has been indicated that if all the new 37.5 parts oil-masterbatches were made available to the consuming industry not later than March 15th, the interchangeability of the various oils can definitely be accomplished by June 30, 1953.

Accordingly, in this respect, RFC is going to produce and make available to industry X-726, X-728, X-730, X-731, X-735, X-736 and X-747 during the month of February, and X-727 and X-729 and others, if requested, by March 15th.

More news on the disposal of synthetic rubber facilities also came to light during the past period. Senator John Bricker (Rep., Ohio) and Senator Homer Capehart (Rep., Ind.), have called for the transfer of government hearings on the synthetic rubber program out of the Senate Armed Services Committee into the Banking and Currency Committee. Senator Capehart said the matter should be referred to the latter committee because it concerns only the Reconstruction Finance Corporation. In addition, he said, the rubber is now for domestic rather than military use.

The synthetic rubber hearings were transferred to the Armed Services Committee during the 81st Congress because of the strategic importance of the stockpiling program. Now, according to Senator Bricker, stockpiling is no longer a problem and therefore there is no reason for the Armed Services Committee to consider the problem.

The decision on which Senate committee will handle disposal is of great interest. In the past, the Armed Services Committee has favored government control of the program. Sentiment in the Banking and Currency Committee is believed to be more favorable to allowing private industry to buy the plants. The decision as to which committee will handle the program lies with Vice-President Richard Nixon.

While matters relating to synthetic rubber occupied the spotlight in the United States, in London the "working party" of the International Rubber Study Group came up with a plan to stabilize the price of natural rubber at something over the price of synthetic. The plan is to be passed on to a full meeting of the organization next May in Copenhagen. There it will be considered further with a view toward asking the United Nations to call a special commodity conference with power to implement its decisions.

The working party declined to disclose any details of the stabilizing mechanism it had considered practical other than to reveal it would be of a "buffer stock" type. In general terms, this would mean some specially established board would buy natural rubber when its price fell below a specified minimum and would sell rubber from its stocks when the price got above a specified maximum.

Exactly what these minimum and maximum price levels would be was presumably to be left to future determination. The sub-committee was also silent on where the stabilizing board would get the vast sum of money, estimated to run into millions of dollars, needed to buy up rubber when prices got "too low."

U. S. Endorsement Needed

Implementation of the plan would depend on United States endorsement. Sponsors also made in clear that if the United States would endorse the scheme, it would be asked also to raise its price of synthetic rubber closer to what the sponsors claimed would be the real "commercial" price if industry were privately owned and had to replace its plant at current costs. This would permit the stabilized price of natural rubber then to be set at a figure somewhere over present prices of roughly competitive grades of synthetic rubber.

The plan for stabilizing natural rubber's price at something approximating present levels was very much along lines most favored by natural rubber producers. Nevertheless, it was presumably approved at least as being "practical" by Americans attending the sub-committee conference.

This, in itself, was considered a remarkable position for Americans to take, London observers noted, since American and other opponents of the device have long asserted that stabilizing schemes were not only undesirable but unworkable as well. They pointed to the failure of previous attempts along the same lines to stabilize the price of tin and other commodities. They figured stabilization of rubber's price would be infinitely more difficult now that the world could make its own synthetic at will, thereby leaving vast quantities of natural rubber unbought if deemed to be too expensive. How the plan would overcome these obstacles and whether it would also involve restriction of production was not revealed.

Industry Dividends are Tops

According to the New York Stock Exchange, cash dividends paid on common stocks listed on the Exchange reached a new high in the nine months ended September 30. On an industry basis, rubber companies showed the largest increases in dividends—28.2%. It was the tenth year in a row in which nine-month dividends established a record. For all stocks listed, the nine-month total in 1952 amounted to $3,904,487,000, up 4.1% over the first nine months of the previous year.

John L. Collyer, president of the B. F. Goodrich Co. and frequently an outspoken critic of rubber price fixing, declared before the London conference began that an "international rubber cartel is neither necessary nor practical." He insisted there will be a market for all the natural rubber that can be produced and that there is little likelihood of a burdensome surplus.

Defines Ceylon Problem

Another aspect of the natural rubber picture came from W. Averell Harriman, who recently retired as Director for Mutual Security. Mr. Harriman expressed concern over a deal by Ceylon to ship 250,000 tons of natural rubber to Red China during the next five years.

In a farewell report to Congress, Mr. Harriman said that the Ceylon government had concluded the deal with the Reds after having spurned a United States offer to buy the rubber, a strategic material, at the existing world market prices. Ceylon preferred to negotiate a five-year deal with Peiping, he said, because the communists consented to pay 40 per cent higher than the market prices.

Mr. Harriman also reported that the Ceylon government had insisted on a $50,000,000 economic aid program from the United States over the next five years as part of its condition for selling the rubber to the American government. This nation could make no such promise and so Ceylon signed with the communists, he said, "despite the fact that it has an anti-communist government."

Mr. Harriman cited the Ceylon rubber shipments in an eighty-nine-page report telling of the problems involved in blocking shipments of strategic materials to the communist world. He said the deal was "important in itself" because the island was the only non-communist nation now shipping rubber to Moscow-dominated areas.

"The solution of Ceylon's new relationship with Communist China must remain a matter of critical concern to the United States," Mr. Harriman said, adding: "Communist China has apparently entered into this agreement not only in order to obtain the rubber which it needs but also for the sake of the political and propaganda value which the trade agreement bears in southeast Asia."

Ceylon's population of about 7,000,000 persons is heavily dependent on food imports, particularly rice, and on exports of rubber and tea. A factor in the deal with China, the outgoing administrator said, was the Reds' promise to deliver 270,000 tons of rice yearly. The United States also offered to send rice to Ceylon but the price was "not satisfactory to Ceylon representatives" he asserted.

Price Controls Suspended

News of more immediacy came from the Office of Price Stabilization which, on January 28, 1953, suspended price ceilings on latex foam rubber lines at all levels. The action was taken in General Overriding Regulation 3, Revision 1. OPS explained that manufacturers' selling prices are substantially below ceilings and wholesale and retail prices reflect a similar trend.

The commodities affected include uncovered latex foam sponge rubber pillows and mattresses (covered pillows and mattresses have already been suspended, along with other bedding, by GOR 5). Also affected by GOR 3, Revision 1, are latex foam cushions manufactured for furniture, buses and railroad cars, and topper pads, such as those used in the construction of automobile seats.

The suspension also applies to rubber latex foam material sold in the form of sheets and slabs and usually fabricated into articles of various types, as well as small molded latex sponge rubber articles of various types, the ceilings for which had been established by SR 8 to CPR 22.

Pertinent Sprinkler Story

Several years ago a Massachusetts rubber plant experienced a loss of over $100,000 when an unsprinklered dryer oven caught fire and the surroundings were thoroughly drenched in the time required to bring the fire under control. The fire started when synthetic rubber-coated fabric came in contact with steam pipes and ignited. When an operator opened the door to investigate the unusual heat, a blast of flame roared out and opened a number of nearby sprinklers. This water, of course, could not reach the blazing oven interior. Shortly thereafter, side-wall type sprinklers were installed in the oven, with an easily accessible control valve located at the rear. Fire struck again last March, this time steam heating coils igniting starch residue on the floor of the oven. Three sprinklers in the oven operated, plus one outside the oven, and quickly brought the fire under control. The amount of loss was negligible compared to the first fire. Need more be said?

PCFA Elects New Officers

S. Ernest Kulp (Masland Duraleather) was re-elected president of the Plastic Coatings and Film Association at the organization's annual meeting held recently in New York City. G. H. Callum (U. S. Rubber) was again elected vice-president of the association whose members produce a major portion of the national yardage of vinyl sheeting 10 mils and over, and of vinyl and pyroxylin coated materials. The association's new Executive Committee includes, besides Mr. Kulp and Mr. Callum, Walter F. H. Mattlage (DuPont), John W. F. Young (Federal Leather), K. L. Edgar (Firestone Plastics), R. G. Landers (Landers Corp.), and J. D. Lippmann (Textileather). Paul F. Johnson continues as executive secretary.

ONTARIO RUBBER SECTION HEARS DISCUSSIONS ON RUBBER INDUSTRY

Approximately 80 members and guests of the Ontario Rubber Section of the Chemical Institute of Canada attended the January 14th meeting held at Muirhead's Restaurant in Kitchener, Ont., Canada. There were two papers presented which dealt with the past and future of the Canadian rubber industry. J. A. Martin, former rubber controller in Canada, spoke on the "History of the Rubber Industry in Canada."

Mr. Martin reviewed briefly the historical background of rubber and its very limited use prior to the advent of the automobile. In 1900, he said, total world consumption of new rubber was 53,000 long tons. Fifty years later, this figure rose to 2,300,000 long tons.

During this time, Mr. Martin said, there were many ups and downs in general business which caused violent fluctuations in rubber prices. He discussed the effects of the various plans to regulate rubber prices, notably the Stevenson plan and the International Rubber Regulation Agreement of 1934-1944. These plans failed in the end, he declared, because they protected inefficiency and encouraged production in areas that could not be controlled.

Mr. Martin also discussed the technical committees set up in Canada during the war to pool technical knowledge and to discover the best ways in which to use the available rubber. He cited the excellent job done by the Mechanical Committee in substituting synthetics and reclaim for making essential rubber goods.

Rubber Industry Looks Ahead

The second speaker of the evening was C. C. Thackray, president of the Dominion Rubber Co., and president of the Rubber Association of Canada. The great development of Canada's natural resources and its increasing population, auger well for the future of the country's rubber industry, he declared. The growth of the rubber business during the last decade, he said, was actually more than double the rate of growth for all other reporting industries in the non-durable goods class. During the same period, he said, the use of rubber products per person in Canada has risen from 7¾ pounds per person to about 14 pounds.

He also pointed out that the unprecedented expansion in the use of motor cars in Canada is having a very favorable influence upon the rubber industry, as the automobile industry accounts for some two-thirds of all rubber business. The development of new products requiring volume uses of rubber are among the other favorable factors in the future of the rubber industry. He gave full credit to the work of the scientific and research men for their ingenuity in developing new compounds and new techniques, and also discussed the advantages of synthetic rubber and the new blends of rubbers and plastics.

Waiting for your copy of the 1953-54 RUBBER RED BOOK? Complete and return all questionnaires quickly!

ALBERT OFFERS TO PURCHASE SEIBERLING LATEX PRODUCTS

Sydney L. Albert, president of L. Albert & Sons, Akron, Ohio, has offered to buy all the common and preferred stock of the Seiberling Latex Products Co., Barberton, Ohio. Mr. Albert's offer to buy all the stock was made known in a letter sent to the 142 shareholders by T. K. Seiberling, president of Seiberling Latex. Mr. Albert agreed to pay $565,680 for three outstanding issues of stock, a total of 12,132 shares.

Seiberling Latex was founded in 1928 by F. A. Seiberling, founder and former chairman of the Seiberling Rubber Co., and his brother, the late Charles W. Seiberling, co-founder and vice-president of the tire firm. T. K. Seiberling has headed Seiberling Latex since the death of his father, C. W. Seiberling, in 1946. The former is also manager of heel sales and development for Seiberling Rubber.

Mr. Albert's purchase offer also includes the Jasper Rubber Co. of Jasper, Ga., and two similar plants in Central Ohio and Southeastern Pennsylvania. The Jasper enterprise is owned by Georgia interests but produces rubber goods for Seiberling Latex. It was built about one year ago. Cost of these plants and the Seiberling Latex stock would exceed $600,000. Mr. Albert's offer is subject to one condition—that the owners of at least 67% of the three issues of Seiberling Latex stock will agree to sell. It is understood, but not confirmed, that members of the Seiberling family own about 60% of the stock.

T. K. Seiberling, in his letter to shareholders, notified them that the money required to complete the purchase is on deposit with the First National Bank of Akron in an escrow account. The bank was authorized to accept deposits of stock up to and including February 4 at these prices: $190 a share for each of the 1,452 shares of 6% preferred stock; $140 a share for each of the 635 shares of 6% prior preferred stock; and $20 a share for each of the 10,045 shares of common stock.

Conditions of Purchase Offer

Mr. Albert's offer is conditioned upon stockholders depositing at least 937 shares of the 6% preferred stock, 426 shares of the 6% prior preferred stock, and 6,372 shares of common stock. Mr. Seiberling also informed the owners that the officers and directors of the company had drafted undated resignations. The latter will become effective if the minimum number of each class of stock is sold to the prospective purchaser.

In a second letter addressed to each shareholder, the president wrote that he and his immediate family will sell all their stock in the company. He also emphasized to the shareholders that neither he nor his immediate family are a party to or have a financial interest in the offer being made.

At the peak of its operations, Seiberling Latex employed about 400 persons. Production has been cut back steadily in the Barberton plant in the past year and as of the present there are only 20 to 25 persons employed there. The factory has 98,000 square feet of floor space and is located on 19.9 acres of land.

Manufacturing at the New Bremen Rubber Co., New Bremen, Ohio, controlled by Seiberling Latex, is proceeding at near capacity with about 150 persons employed. If the purchase goes through as expected, Mr. Albert said he hopes the Barberton plant can be streamlined so it can be continued in operation.

CALCO CHEMICAL DIVISION ANNOUNCES TWO NEW SALES APPOINTMENTS

Philip G. Connell, Jr.

Rupert W. Daniels

Philip G. Connell, Jr., has been appointed assistant manager of rubber chemical sales in the Intermediate and Rubber Chemicals Department, Calco Chemical Division of the American Cyanamid Co. At the same time, Rupert W. Daniels was named manager of intermediate sales for the same department of the company. Mr. Connell attended Princeton University, and was graduated in 1943 with a B.S. degree in chemical engineering. He joined Calco in 1946 as a student trainee and worked in the Production and Development Departments prior to his promotion to the Intermediate and Rubber Chemical Sales Department. Mr. Daniels is a graduate of Dartmouth with a B.A. degree in chemistry. Since coming to Calco in 1936, he has been identified with all phases of development, production, purchasing and sale of coal tar products and intermediates.

Protektor Anti-Cracking Agent

A new anti-cracking agent which combines antioxidant action is currently being offered American rubber manufacturers by Heka Imports & Exports, Inc., 50 Broad St., New York 4, N. Y. Called "Protektor," the material is a special type of exuded ozokerite wax manufactured in West Germany, and is available in commercial quantities. Protektor has a specific gravity of 0.91 and a melting point of 52 to 54° C. It is soluble in benzene at 20° C. and is insoluble in water, acetone, petroleum ether, and other solvents. In application, it is inclined to bloom out slightly on the surface of the rubber, thus forming a thin, homogeneous protective layer on the finished rubber product. Of special interest to the wire and cable field is the fact that the material is said to possess a high disruptive strength at low dielectric constant and also reduces both the microporosity of the rubber as well as its capacity for absorbing water. Protektor is used as a compounding ingredient, with quantities of 1 to 1.5% generally being sufficient to secure desired results. Samples and technical literature are available from the importers on request.

Dow Building New Coast Plant

The Dow Chemical Co., Midland, Mich., has begun construction of a plant at Torrance, Calif., for the manufacture of "Styron," a polystyrene plastic material. Facilities will include equipment for the manufacture of plastic granules in a variety of colors in addition to clear, uncolored material. Scheduled for completion in the fall of 1953, the plant will be part of a three-phase program for increasing Styron production facilities. A large new addition to the firm's plastic building at Midland is now in operation, and a newly-completed plant on the Thames River at Allyn's Point, Conn., went into full production last October. The Torrance plant, being built on a 53-acre tract, will have nearly 72,000 square feet of floor area, including a four-story production building, a large warehouse and office and employee quarters.

NSF-SPI Plastic Pipe Study

The research evaluation study on extruded thermoplastic pipe being conducted by the National Sanitation Foundation, whose headquarters are at the School of Public Health of the University of Michigan, Ann Arbor, Mich., has entered its second year of operation. The project, sponsored by the Society of the Plastics Industry, is to evaluate the non-toxicity of plastic pipe in the underground transmission of water. Plastic raw materials now undergoing tests to assure complete health safety in water transmission include polyethylene, polystyrene, cellulose acetate butyrate, and copolymers of polyvinyl chloride.

ACS RUBBER DIVISION SETS 1953 STANDING COMMITTEES

The Division of Rubber Chemistry of the American Chemical Society has announced the appointment of members to its various standing committees for 1953. The committees and their members follow:

Advisory Committee on Local Arrangements: H. F. Palmer (Kentucky Synthetic Rubber), chairman; G. M. Wolf (Sharples Chemicals).

Auditing Committee: C. W. Christensen (Monsanto); Roy M. Marston (Binney & Smith); R. B. Appleby (DuPont).

Bibliography Committee: J. McGavack (U. S. Rubber), chairman; C. C. Davis (Boston Woven Hose); M. E. Lerner (RUBBER AGE); A. W. Oakleaf (Phillips Chemical); V. L. Burger (U. S. Rubber); D. E. Cable (U. S. Rubber); T. L. Wilson (U. S. Rubber); R. K. Kuhns (U. S. Rubber); and Henry Haxo (U. S. Rubber).

File and Record Committee: J. D. D'Ianni (Goodyear), chairman; E. A. Willson (Goodrich); Miss Dorothy Hamlen (Akron University); and Miss Betty Jo Clinebell (Akron University).

Finance and Budget Committee: L. V. Cooper (Firestone); L. H. Howland (Naugatuck); R. C. Knapp (U. S. Rubber).

Funds for Library Committee: W. L. Semon (Goodrich); J. R. Moore (Harwick Standard).

Future Meetings Committee: A. E. Laurence (Phillips Chemical); G. N. Vacca (Bell Telephone); and G. M. Wolf (Sharples Chemicals).

Library Committee: B. S. Garvey, Jr. (Sharples Chemicals); Fern Bloom (Goodrich); Lois Brock (General Tire); Dorris Hall (Firestone); Dorothy Hamlen (Akron University); H. E. Simmons (Goodyear); H. N. Stevens (Goodrich); Leora Straka (Goodyear); H. C. Tingey (U. S. Rubber); and R. F. Wolf (Columbia-Southern).

Membership Committee: J. J. Hoesley (Goodyear), chairman.

Nominating Committee: F. W. Stavely (Firestone); A. E. Juve (Goodrich); R. G. Seaman (*India Rubber World*); W. J. Geldard (Naugatuck); and E. B. Curtis (R. T. Vanderbilt).

Papers Release Committee: C. R. Haynes (Binney & Smith); C. C. Davis (Boston Woven Hose); and A. M. Neal (DuPont).

Papers Review Committee: C. R. Haynes (Binney & Smith); C. C. Davis (Boston Woven Hose); S. G. Byam (DuPont); and A. M. Neal (DuPont).

Tellers Committee: M. E. Lerner (RUBBER AGE); R. A. Emmett (Binney & Smith); and H. A. Outcault (St. Joseph Lead).

Liaison Committee: R. E. Hutchinson (Firestone); Daniel Reahard, Jr. (General Tire); Stewart L. Brams (Dayton Chemical Products Laboratories); Joseph S. Jorczak (Thiokol); Lyle L. Longworth (Monsanto); and James C. Walton (Boston Woven Hose), chairman.

Have you received your questionnaires for the 1953-54 RUBBER RED BOOK? If not, contact us at once!

Unique World War II Story

Dr. Shu Kambara, director of the Polymer Research Institute of Japan, now engaged in research at the University of Akron to determine the molecular action involved in vulcanizing synthetic rubber, has revealed an interesting method of shipping natural rubber devised by the Japanese during World War II. During the war, he said, Japan had available almost unlimited supplies of natural rubber. However, the U. S. Navy entered the picture, sinking Japanese cargo vessels carrying the rubber, and so, supplies were cut off. The Japanese then figured another way of shipping the rubber. Using cocoanut shell fiber they made acetic acid. This they used to coagulate the natural rubber into a sticky gum. Layers of this gum, 30 feet wide and 100 feet long, were spread out on the water. The sides and ends were pulled up to form a long balloon riding in the water. Then the Japanese pumped in crude oil and bauxite—which their homeland also lacked—and sealed the whole affair. The seagoing "hot dogs" were cast adrift. Ocean currents were such that in two to three months they floated northward to Japan. Separating the rubber from the oil and bauxite sometimes proved ticklish, but the rubber barges had their advantages. They were unsinkable and needed no tending. To keep track of them, the Japanese rigged simple radio devices which sent out steady signals. From airplanes and submarines, they were able to keep a constant "fix" on their rubber barges and most of them got through.

Harmon Joins Goodrich Chemical

Harmon Color Works, a division of the B. F. Goodrich Co., became a part of the B. F. Goodrich Chemical Co. on February 1, 1953. Orville E. Isenburg, formerly international sales manager for Goodrich Chemical, has been appointed sales manager for Harmon Color. Victor Chartrand, formerly president of Harmon Color, has joined Goodrich Chemical in an advisory capacity in the field of organic color sales. Manufacturing and technical activities for Harmon Color will continue under the direction of H. T. Madden and Vincent Vesce, respectively. Harmon organic colors will continue to be manufactured at Haledon and Kearny, New Jersey, and sales headquarters will be located in Cleveland, Ohio at the general offices of Goodrich Chemical. Harmon Color Works was purchased by Goodrich in 1950. The Harmon product line—organic color pigments—is closely allied to several Goodrich Chemical product groups, and fits into the company's operations from the standpoint of development, production and marketing.

PHILADELPHIA ELECTS OFFICERS; HEARS FISHER ON RUBBER ROADS

Approximately 135 members and guests of the Philadelphia Rubber Group attended the meeting held on January 23 at the Poor Richard Club, Philadelphia, Penna. The meeting featured an election of officers for the 1953 season and an address by Harry K. Fisher of the Natural Rubber Bureau on "Rubber in Bituminous Highway Paving." A film, "Stretching Highway Dollars with Rubber Roads," was shown and a question and answer period followed the address. Officers elected for the 1953 season include:

Chairman, George J. Wyrough (R. E. Carroll); *Vice-Chairman*, A. J. DiMaggio (Firestone); *Secretary-Treasurer*, Mortimer A. Youker (DuPont). In addition, J. R. Mills (Whitehead Bros.), L. E. White (Walker Bros.), and T. W. Elkin (Armstrong Cork) were elected directors for one year. Ralph Harper (Aero Materials Laboratories—U. S. Navy Base, Philadelphia) and Leo Dete (Carlisle Tire) were elected directors for a two-year term. Lindsay Shaw (Goodrich) and George Brannon (Binney & Smith) were elected directors for a three-year term. Nominees for division directors included H. J. Reid (L. H. Gilmer) and Mr. Elkin.

In his paper, Mr. Fisher pointed out that rubber in some form is now being used in highways in 22 states with 7 more lined up to do so in the near future. He also stated that in 1951 it cost $1,500,000,000 to repair the 3,200,000 miles of U. S. highways and streets. Because of this, he said, it is necessary to work out methods of getting better highway service. Results of tests run to date indicate the use of rubber with asphalt in bituminous highway paving can possibly stretch the life of the road.

Mr. Fisher itemized the following advantages to be gained by using rubber in roads: (1) Less susceptible to temperature changes; (2) Greater elasticity; (3) Better cohesion of the mix. According to the speaker, the amount of rubber to be used is approximately 7½% of the weight of the asphalt used in the mixture when synthetic rubber is used and 5% when natural rubber is used.

He indicated that natural rubber was originally used in crumb form with some curing ingredients incorporated and heat applied at the rubber producing plant. However, indications are that raw rubber gives better results according to data obtained from the Natural Rubber Bureau. This latter mixture contains crude rubber and infusorial earth.

Goodrich Chemical Hycar 1043

B. F. Goodrich Chemical Co. has introduced a new low-temperature polymerized, medium-low acrylonitrile polymer, Hycar 1043. It is similar to Hycar 1013, but is said to offer easier processing and improved physical properties. Its relationship to Hycar 1013 is analogous to that of Hycar 1042 to Hycar 1012. It also offers improved mixing and extrusion, better cement properties, and more uniform quality, the company states.

GOVERNMENT RESTS ITS CASE IN DUPONT ANTI-TRUST SUIT

On January 20, the government rested its anti-trust suit against E. I. du Pont de Nemours & Co., Inc., General Motors Corp., and U. S. Rubber Co. and three lesser corporations after twelve trial days in which more than 1,000 documents went into the record and some of the numerous defendants were dropped. Federal District Court Judge Walter J. La Buy then recessed trial of the monopoly and conspiracy suit against the six corporations and members of the du Pont family until February 16 when the defense will present its side.

Top defense attorneys estimated they might take three or four times as long as the government. They have scheduled many "live" witnesses in contrast to the two the government put on the stand. Well-known figures, including Charles E. Wilson, former president of General Motors and now Secretary of Defense, will be questioned.

Of the original 118 defendants, a total of 48 minors ranging in age from 4 to 20 were eliminated by government-defense agreement a few weeks ago. Dismissal of 36 adults is being held up by a squabble over whether future action against them will be barred or not. In addition, the late Lammot du Pont was removed from the list by official notification to the court of his death. The government wants to retain only 82-year old Pierre S. du Pont as principal defendant. Twenty-six other family members would be retained solely because of trust arrangements which might be affected.

Seek Additional Dismissals

This may be changed still further. One of the court-appointed trial guardians for minors involved said immediate dismissal would be sought for the 11 minors and 15 adults in the so-called beneficiary defendant group. The Wilmington Trust Co., a corporate defendant, will also press for dismissal.

F. B. Davis, Jr., former president of the U. S. Rubber Co., was one of the witnesses called by the government. Government attorneys produced a contract negotiated in 1931 which gave U. S. Rubber 50% of General Motors' tire business. Mr. Davis, asked if he consulted the du Ponts about the operations of U. S. Rubber, replied: "I was given the job of running the company, and I ran it with an extraordinary degree of independence."

He testified, however, that he did talk with Irenee and Pierre du Pont "about the financial side of the business." Mr. Davis said U. S. Rubber increased its sale of tires to General Motors after the 1931 contract, but he said the increase beyond the contract terms was the result of diligent salesmanship.

The contracts and correspondence read by government attorneys showed, they said, that General Motors' divisions were billed for the tires at actual market price, but actually purchased them at a much lower figure. It was reported that a rebate to the Chevrolet Division in 1934 was $1,437,087 and in 1935 was $1,044,516. Similar rebates were made to other divisions of GMC, government attorneys contended.

Later, a 900-page deposition taken last summer in pre-trial questioning of Pierre du Pont was disposed of by government attorneys by reading some excerpts. Thus, the government ended its case which will be resumed on February 16 when the defense presents its case.

FIVE NEW EXECUTIVE APPOINTMENTS ANNOUNCED FOR FAWICK AIRFLEX

R. S. Huxtable, president of the Federal Fawick Corp., Cleveland, Ohio, has announced five new executive appointments for the Fawick Airflex Division of the corporation. John V. Eakin, who has been with the company since 1943, has been assistant general manager. He was formerly sales manager and Southwestern district manager. Clement Reeves has been named sales manager succeeding Mr. Eakin. Mr. Reeves joined Fawick in 1945 and has been in charge of sales to manufacturers of earth moving and construction equipment. Working with Mr. Reeves will be K. R. Spelman, who has been named assistant sales manager. Mr. Spelman has been a sales engineer since he joined Fawick in 1945. J. S. Walsh, formerly chief engineer and associated with the company since 1944, has been named director of engineering and service. W. A. Franck, who was design and development engineer and with the company since 1943, has been appointed chief engineer. According to Mr. Huxtable, these appointments were made to provide Fawick with a more effective management team in anticipation of increased sales activity. These promotions were also designed to coordinate operations of the division with the corporation formed by the merger of Fawick Airflex and Federal Motor Corp.

Process Leather Co. Formed

Process Leather Co. has been formed in Sidney, Ohio, for the manufacture of reconstituted leather using rubber and plastic binders and chemicals. The new company purchased the manufacturing plant of Process Leather, Inc., a subsidiary of the Gro-Cord Rubber Co. at Sidney. Daily output of the new company has been estimated at approximately 5,000 sheets, 48 by 48 inches square, of various thicknesses. The process leather finds use in shoe products, gaskets, luggage and in industrial applications. Michael Johnson is the new owner and president of the Process Leather Co., with Myron J. Watson as manager.

Heiberg Elected ACESS President

Arthur B. Heiberg, associated with the Development Department of the Firestone Tire & Rubber Co., has been elected president of the Akron Council of Engineering and Scientific Societies. James R. Dorsey, electrical engineer of the B. F. Goodrich Co., has been elected vice-president of the group while John W. Kasko, in charge of the Chemigum plant of the Goodyear Tire & Rubber Co., was elected secretary. J. O. Cole, research chemist associated with Goodyear, has been named treasurer of the Council.

Elected Marbon Vice-President

Election of D. Morris Pratt as vice-president of the Marbon Corp., a subsidiary of the Borg-Warner Corp., was recently announced. Mr. Pratt joined Marbon in 1934 as a laboratory technician, and in 1946 became sales manager, a title he will continue to hold in addition to the vice-presidency. He was previously associated with the Goodyear Tire & Rubber Co. and Herron Bros. & Meyer, Inc. He attended Oberlin School of Commerce.

Uskon Radiant Heating Panel

An electrical radiant heating panel only 1/16 of an inch thick which can be cemented to the ceiling like wallpaper has been announced by the U. S. Rubber Co. The new panel is a sheet of conductive rubber that is the heating unit, sandwiched between layers of thin plastic and aluminum foil. The panels are called "Uskon," and are extremely light, weighing only 6 ounces per square foot. They are bonded to ceilings of plaster, sheetrock or similar smooth material by means of a special adhesive. The number of panels required is determined by climate, insulation, and other factors, but generally, Uskon panels do not cover the entire ceiling of the room to be heated. Three sizes of panels are available, 4 by 6 feet, 4 by 4 feet, and 3 by 4 feet. Both outer surfaces are covered with aluminum foil to keep out moisture. The panels are rated at 22 watts per square foot (75 BTU's) and are available for either 115 or 230 volts.

Adds Rubber Molding Equipment

Electric Cords & Supply Co., Los Angeles, Calif., is now installing new rubber molding equipment to increase its production of molded cables and components. The firm also manufactures electric cords and harnesses, instrument control panels, electric test equipment and related electronic products built to customer specifications. During the past year, the company added 12,000 additional feet of floor space making the present plant area a total of 30,000 square feet. Deliveries for the company in 1952 exceeded $1,000,000 and the current backlog is 129% greater than that of a year ago. Warren W. White, formerly associated with Standard Coil Products, Inc., has been appointed chief engineer of the company. About 75% of the company's business at the present time is devoted to defense orders.

Superior Mold Plans Expansion

Superior Mold & Die Co., Stow, Ohio, has started another expansion program that will double the capacity of its present plant. The project will provide the firm with a total of 15,000 square feet of floor space and working facilities for about 200 persons. Superior Mold now employs about 120 persons. Constructed of brick and steel, the addition will be of modern design to match the original building erected in 1945. The company started as a partnership in 1943 with three employees. In 1945, the present building was constructed. Three of the company founders, Charles and Alex Yamokoski and J. L. Chancellor, who helped establish the business in 1943, continue as its officers. Among Superior Mold's products are mechanical molds for the rubber and plastics industries.

Instron Engineering Corp. has announced the availability of a new bulletin describing the Instron Integrator, an electromechanical device for obtaining the time integral of a varying input signal.

Joins Stokes Molded Products

John S. Plumb

John S. Plumb, formerly vice-president and factory manager of the U. S. Rubber Reclaiming Co., Buffalo, N. Y., has been named factory manager of Stokes Molded Products, Inc., Trenton, N. J. Mr. Plumb was graduated from Princeton University in 1928 with a B.S. degree in chemical engineering. He joined U. S. Rubber Reclaiming in 1928 as a process control chemist and from 1931 to 1934 served as assistant chief chemist. In 1934 he was named production manager, a position he held until 1936 when he was named factory manager. In 1942, Mr. Plumb was named a vice-president and a director of the company in charge of all factory operations. He was also director of research and development for the company. From 1942 until the present he has been president and treasurer of the D. S. Plumb Co., Newark, N. J., manufacturers of instrument parts. Mr. Plumb left U. S. Rubber Reclaiming in 1951. He has presented several papers before the Division of Rubber Chemistry of the American Chemical Society and for a period of one year served as lecturer on rubber chemistry at the University of Buffalo.

Currently Active Polymers

The Office of Synthetic Rubber, Reconstruction Finance Corporation, has issued a list of currently active experimental polymers. Those experimental polymers not shown here have been discontinued or replaced by permanent numbered polymers. Active experimental polymers as of December 31, 1952, follow:

X-617 GR-S Latex	X-706 GR-S
X-619 GR-S Latex	X-708 SP-GR-S
X-628 GR-S	X-710 GR-S Latex
X-629 GR-S	X-711 GR-S Latex
X-633 GR-S Latex	X-712 GR-S
X-654 GR-S	X-713 GR-S
X-667 GR-S Latex	X-714 GR-S
X-683 GR-S Latex	X-715 GR-S
X-684 GR-S Latex	X-716 GR-S
X-693 GR-S	X-717 GR-S
X-695 GR-S Latex	X-718 GR-S
X-700 GR-S	X-721 GR-S
X-722 GR-S	

A new 8-page, four color, catalog on V-belts for industrial use is available from the Thermoid Co., Trenton, N. J.

Parachute Testing Program

Goodyear Aircraft Corp., Akron, Ohio, is presently conducting a unique program of research dealing with the free-fall tendencies of parachutes under terms of a contract with the U. S. Air Force. Tests are being conducted in the firm's spacious airship dock, said to be the largest building in the world without interior supports. The building provides an atmosphere free from wind currents and also an unusual amount of unobstructed height and floor space. The company's Research and Development Department has spent considerable time drop-testing the latest military and civilian type parachutes from the ceiling of the 200-foot high airship dock. The test setup at Goodyear Aircraft has also been used for the investigation of tow target recovery methods and development of instrumentation systems.

Materials Handling Exposition

All available display space at the National Materials Handling Exposition, which will be held at Convention Hall in Philadelphia, Penna. from May 18 to 22, has been assigned, according to Clapp & Poliak, Inc., New York, N. Y., founders of the show. The show will be the largest industrial capital goods exposition to be held anywhere in the country in 1953. Acting as sponsor for the exposition will be the Material Handling Institute, organization of handling equipment manufacturers. The American Material Handling Society, composed of executives of companies which use mechanical handling systems, will conduct a conference concurrently with the show and will tender a banquet to visitors. Advance registration cards may be obtained from Clapp & Poliak, Inc., 341 Madison Avenue, New York 17, N. Y.

Freitag Doubles Capacity

Completion of an expansion program that has more than doubled the capacity of its plant has been announced by the R. H. Freitag Manufacturing Co., Akron, Ohio. The project, which has been under way for several years, added 52,000 square feet of floor space as demand increased for the production of precision molds and dies. Founded in 1919 by R. H. Freitag, still head of the firm, the company has grown from a large garage to a plant which covers nearly 100,000 square feet of floor space. The company not only makes molds and dies, but tools, fixtures, aircraft and jet engine parts. It employs about 300 persons. To commemorate the opening of the addition, the company acted as host to employees and their families at an open house held from 2:00 to 4:00 P.M. on December 24.

More Certificates of Necessity

The Defense Production Administration has issued a new list of approved Certificates of Necessity for accelerated tax amortization on new or expanded defense facilities. Certificates issued recently include: Shawinigan Resins Corp., Springfield, Mass., $93,175 for vinyl resins.

RUBBER DIVISION LIBRARY RECAPS ACTIVITIES FOR LAST 18 MONTHS

The Library Committee of the Division of Rubber Chemistry, American Chemical Society, has issued a report on the activities of the Rubber Library, which is maintained at the University of Akron, Akron, Ohio, during the first eighteen months of its existence. In the eighteen months that the library has been in operation, 148 requests for information were received and 621 interlibrary loans made for a total of 769 requests. This averages 42.7 requests per month.

This does not take into account the publications of the library, the bibliographies prepared by the library in response to requests, the bibliography of current literature which is compiled from approximately 200 titles, the trade name index which is compiled from the same 200 titles, and the newspaper clipping file of items relating to rubber and plastics.

For example, in the period June, 1951, to November, 1952, bibliographies of references were prepared on rubber linings; mastication of GR-S; the processing of GR-S involving the use of plasticizers; use and application of O-rings; tire design and manufacturing; the uses of rubber in agriculture; the use of lignin in rubber and synthetic rubbers; diaphragms, rubber and elastomer materials; drying of adhesive-coated fabrics; the use of synthetic resins in natural and synthetic rubbers.

Also, the tensile strength of natural and synthetic rubbers; the diffusion of gases through natural rubber and Butyl rubber; the determination of ozone in air; mills and calendars, operation and safety factors; compounding of gutta-percha and balata resins; and behavior of gutta percha and balata toward oxygen and oxidation.

Union Lists of Books and Serials

In addition, a Union List of Books and a Union List of Serials have also been prepared by the Rubber Library. These lists represent the combined holdings of the technical libraries of DuPont, Firestone, General Tire, Goodrich, Goodyear, Glenn L. Martin Co., U. S. Rubber and the University of Akron. The material on these lists can be borrowed through the library on interlibrary loan.

Approximately 200 copies each of the Union List of Books and the Union List of Serials have been sent to members of the Rubber Manufacturers Association, the Division of Rubber Chemistry, and to other libraries. Copies of these lists are sent to anyone on request.

The library has also purchased new books and periodicals in the fields of rubber, resins, and plastics, and also older material which is lacking in the combined holdings of the technical libraries, with the aim of having a complete library in these fields.

While the services rendered by the library are free, there are certain expenses involved in its operation. For this reason, the Library Committee of the Division of Rubber Chemistry is seeking the financial support of the rubber industry. A maximum contribution of $100 from each contributor would go far in assuring the continuance of the library service, the committee states. Smaller contributions, of course, are also welcomed. Checks should be made out to the Library Fund, Rubber Division, A.C.S., and mailed to Amos Oakleaf, c/o Phillips Chemical Co., 605 Evans Building, Akron 8, Ohio. Mr. Oakleaf is treasurer of the Division of Rubber Chemistry.

UNITED CLAY MINES OPENS NEW CLAY PLANT AT NORTH AIKEN, S. C.

United Clay Mines Corp. of Trenton, N. J., has announced completion of its new plant at North Aiken, S. C., for the production of high grade clays for the rubber industry. Equipment used at the new plant is of the latest type. Stocks of rubber clay are carried at the company's main warehouse at Trenton, N. J., and also at Liverpool, Ohio.

Heyden Chemical Promotes Degener

Fritz Degener, associated with the Heyden Chemical Corp., New York, N. Y., since 1930, has been appointed general sales manager of chemicals. He had been assistant sales manager since 1948 and served as sales manager of the company's Chicago branch office from 1938 to 1948. From 1935 to 1938, Mr. Degener was a sales representative in the Chicago branch office and from 1930 to 1935 served in a similar capacity at the New York office. Before joining Heyden Chemical, Mr. Degener was a sales representative for the Winthrop Chemical Co. Mr. Degener is past-president of the Chicago Perfumery, Soap and Extract Association and a member of the Chicago Drug and Chemical Association, the Chemical and Allied Industries Association of Michigan, the Salesmen's Association of the American Chemical Industry and the Chemists' Club. He specialized in economics and chemistry at the University of Berlin, Pratt Institute and Columbia University.

Hemes Forms Duroflex, Inc.

Duroflex, Inc., has been formed at Buena Vista, Va., for the manufacture of rubber and plastic coated fabrics and various products fabricated from them. Edward C. Hemes, who until January 1, 1953, was executive vice-president of Vulcan Rubber Products, Inc., Brooklyn, N. Y., is head of the new company. Construction is already underway for the new firm. First sections of the new plant are expected to be open by February 15, with production slated to begin about March 1. It is planned that eventually the plant will provide 50,000 square feet of floor space and that 200 persons will be employed.

Emcol K-8300 Emulsifier

Emulsol Corp., 59 East Madison Street, Chicago 3, Ill., has announced the development of "Emcol K-8300," an emulsifier and stabilizer for natural and synthetic latices. The product is an anion-active fatty amide derivative furnished as an aqueous concentrate. It may be used as an emulsifier in the production of cold rubber latices, and as a stabilizer for natural and synthetic latices or latex formulations including foam rubber, adhesives, etc. It also finds use as a soap extender in low temperature polymerizations. Emcol K-8300 has a total solids content of 39 to 40% and 33 to 35% of its ingredients are active. It has less than 2% inorganic salts, and is amber in color. It is stable in concentrated or dilute solutions at a pH of 4 to 7. Heating at these pH values does not destroy the effectiveness of the product, the company states. It is not stable for prolonged contact or at elevated temperatures above pH 7.0 or below pH 4.0. It is, however, stable at room temperatures for a short time at these pH values. The product is moderately soluble in solutions of electrolytes, aqueous solutions of ethanol, ethylene glycol, acetone, etc. It is insoluble in fats, oils, hydrocarbons and chlorinated hydrocarbons.

M. L. Snyder Firm Incorporates

On January 1, 1953, the firm of M. L. Snyder & Son was incorporated as M. L. Snyder & Son, Inc., Philadelphia, Penna. The incorporation marked the 75th anniversary of the firm which has made a separate corporation of its George A. Johnson Co. plant at Seattle, Wash. It has also made a separate corporation for its D. O. Frost plant and business at Gloucester, Mass. The Canadian plant at Toronto, Ont., remains unincorporated, under the proprietorship of Herbert A. Greene, president of M. L. Snyder & Son, Inc. There have been no changes of personnel, management or policies under the new corporate structure. Other than Mr. Greene, other officers include Herbert M. Simpson, executive vice-president; Samuel Wolf, vice-president in charge of operations; Cassin Snyder, treasurer; and Harry O. Lodes, secretary.

WASHINGTON GROUP HEARS MACK ON POLYBUTENES AND ADHESIVES

The January 21st meeting of the Washington Rubber Group held in the auditorium of the PEPCO Building, Washington, D. C., featured an address by Gerry P. Mack, vice-president and director of research of the Advance Solvents & Chemical Corp., New York, N. Y. Mr. Mack spoke on "Polybutenes and Adhesives."

In his address, Mr. Mack pointed out that polybutene is a generic term for a large series of polymers. They were originally developed in Germany and first imported by us in 1935. By control of the polymerization process it is possible to make polybutenes having the physical properties of colorless oils, to sticky and viscous fluids, to those that are elastic solids approaching rubber in their physical properties and appearance. The determining factor in their physical properties is molecular weight.

The most characteristic difference between polybutenes and rubber is that rubber is unsaturated and therefore can be vulcanized, while polybutenes are saturated, except for one theoretical terminal double bond, and therefore are not subject to vulcanization. Because of this saturation, polybutenes have many interesting properties that make them a valuable material in the adhesive industry. During the last war their use became so great it was necessary to put them on allocation, the speaker noted.

Polybutene Types Discussed

The various types of polybutenes available, their physical properties, solubility characteristics in various solvents as well as viscosity effects, were briefly discussed. The compatability of polybutenes with different resins was pointed out as well as the fact that they are compatible with hydrocarbon type compounds. Their compatibility declines with increase in molecular weight of the polybutenes. The more oxygen present in the compounding ingredient or resin, the less compatible it is, Mr. Mack stated.

When compounding adhesives with polybutenes, several precautions must be observed and the compounding techniques were discussed. Particular emphasis was placed on compounding of the so-called Scotch tapes, and the function of the polybutene as well as resin plasticizers was given. Various other adhesive compounds were mentioned including the wax and asphalt types, and the hot melt adhesives in which polybutenes have found use as plasticizers and resinous components were also discussed.

A synthetic type gutta percha can be compounded from polybutenes by using it with certain types of waxes and resins plus a cyclized rubber derivative. It is far superior in aging properties to the natural product, Mr. Mack declared.

In addition, adhesives from polybutenes have been employed with excellent results in the fields of cellulose lamination, aluminum and tin foil lamination to various types of papers, especially in the use of these foils for food packaging where the colorless and odorless polybutenes are important. These high polymers have another advantage in this field in that they are extremely hydrophobic or water resistant and when used as adhesives they have the ability of giving a moisture proof adhesion with a resulting lower moisture transmission value. In conclusion the emulsification of polybutenes and the use of such emulsions in adhesives was briefly reviewed.

Coming Events in the Rubber Industry

Feb. 23. Quebec Rubber and Plastics Group, Victoria Hall, Westmount, Que., Canada.

Mar. 2-6 A.S.T.M., Spring Meeting and Committee Week, Statler Hotel, Detroit, Mich.

Mar. 3. Los Angeles Rubber Group, Hotel Statler, Los Angeles, Calif.

Mar. 18-20. Rubber Division, A.C.S., Hotel Statler, Los Angeles, Calif. (In conjunction with 122nd meeting of A.C.S.).

Mar. 19. Quebec Rubber and Plastics Group, Queen's Hotel, Montreal, Que., Canada.

Mar. 20. Boston Rubber Group, Spring Meeting, Hotel Somerset, Boston, Mass.

Apr. 7. Los Angeles Rubber Group, Hotel Statler, Los Angeles, Calif.

Apr. 10. New York Rubber Group, Spring Meeting, Henry Hudson Hotel, New York, N. Y.

Apr. 16. Quebec Rubber and Plastics Group in Joint Meeting with S.P.E. and S.P.I., Queen's Hotel, Montreal, Que., Canada.

Apr. 17. Detroit Rubber and Plastics Group, Detroit-Leland Hotel, Detroit, Mich.

May 1. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

May 5. Los Angeles Rubber Group, Hotel Statler, Los Angeles, Calif.

May 15. Buffalo Rubber Group, International Meeting, Jointly with the Ontario Rubber Section C.I.C., General Brock Hotel, Niagara Falls, Ont., Canada.

May 27-29. Rubber Division, A.C.S., Spring Meeting, Hotel Statler, Boston, Mass.

June 19. Boston Rubber Group, Summer Outing.

June 23. Buffalo Rubber Group, Summer Outing.

June 26. Detroit Rubber and Plastics Group, Summer Outing, Hillcrest Golf Club, Detroit, Mich.

June 29-July 3. A.S.T.M., Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Aug. 4. New York Rubber Group, Golf Tournament.

Aug. 22. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Sept. 9-11. Rubber Division, A.C.S., Fall Meeting, Hotel Sherman, Chicago, Ill.

Oct. 2. Detroit Rubber and Plastics Group, Fall Meeting, Detroit-Leland Hotel, Detroit, Mich.

Oct. 6. Buffalo Rubber Group, Hotel Westbrook, Buffalo, N. Y.

Oct. 6. Los Angeles Rubber Group, Hotel Statler, Los Angeles, Calif.

Oct. 16. Boston Rubber Group, Fall Meeting, Hotel Somerset, Boston, Mass.

Oct. 16. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Nov. 10. Los Angeles Rubber Group, Hotel Statler, Los Angeles, Calif.

Nov. 14. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Dec. 11. Boston Rubber Group, Xmas Party, Hotel Somerset, Boston, Mass.

Dec. 11. Detroit Rubber and Plastics Group, Xmas Party, Sheraton-Cadillac Hotel, Detroit, Mich.

Dec. 11. New York Rubber Group, Xmas Party, Henry Hudson Hotel, New York, N. Y.

Dec. 15. Buffalo Rubber Group, Xmas Party.

Apr. 14-16, 1954. Rubber Division, A.C.S., Spring Meeting, Hotel Brown, Louisville, Ky.

Sept. 15-17, 1954. Rubber Division, A.C.S., Fall Meeting, Hotel Commodore, New York, N. Y.

Publication of a twelve-page bulletin describing its line of "Time Cycle Controllers" has just been announced by the Bristol Co., Waterbury 20, Conn.

A technical service report describing the uses and properties of dibutyl adipate is now available from the Witco Chemical Co., 260 Madison Avenue, New York 16, N. Y. Ask for Technical Service Report E-5.

U.S. Rubber Promotes Sawyer

Fred A. Sawyer

Fred A. Sawyer has been appointed development manager of the Footwear and General Products Division of the U. S. Rubber Co. succeeding George Blair, who has announced his retirement from the company after 41 years of service. Mr. Sawyer will make his headquarters in the company's Mishawaka, Ind., plant. He joined U. S. Rubber in May, 1939, as a sales engineer in automotive sales. Later responsibilities included extensive engineering and sales work with foam rubber, fuel cells, automobile mats, and other automotive products. During World War II, he was active in the development and sale of storage tanks for gasoline, water and oil, and other important war projects. Early in 1946, Mr. Sawyer was appointed manager of development sales in the Footwear Division. In July, 1947, he became manager of the company's Chicago, Ill., plant. In October, 1949, Mr. Sawyer was made manager of automotive sales for the products of the Footwear Division, transferring his headquarters to Detroit. Less than three years later, he was appointed assistant development manager of the Footwear and General Products Division, the position he held at the time of his most recent appointment.

Kelly Takes Over New Post

Arthur Kelly, formerly general manager of industrial and aeronautical products manufacturing for the B. F. Goodrich Co., has taken over his new duties as vice-president of manufacturing for the company succeeding Thornton G. Graham, who recently retired. An announcement of Mr. Kelly's election to his new post and of Mr. Thornton's retirement together with biographical details of their careers appeared in the October, 1952 issue of RUBBER AGE.

Opens New Acrylonitrile Unit

The Texas City, Texas, plant of the Monsanto Chemical Co. made its initial shipment of acrylonitrile recently. Acrylonitrile is being produced by Monsanto from acetylene. New facilities at the Texas City plant produce acetylene from natural gas rather than by the conventional process from calcium carbide.

Nitrile Hard Rubber Compound

American Hard Rubber Co., New York, N. Y., has introduced "Ace Tempron," a new synthetic hard rubber compound which is said to make even greater chemical resistance, strength, and economy of hard rubber available for sustained high-temperature applications in handling many corrosive solutions. Based on nitrile rubber, Tempron is a hard rubber and has greater rigidity, heat resistance and chemical resistance than the hard and soft nitrile rubber compounds hitherto available. At present, Tempron is available in four forms: pipe and fittings; molded parts; sheet, rod and tubes; and a hand-fabricating process for making tanks, large fittings, etc., by forming sheets of Tempron around cores or mandrels while still in the soft state prior to vulcanization. In chemical resistance at elevated temperatures, Tempron is said to generally excel other rubber and plastic materials. At room temperatures, it resists nearly as many inorganic corrosives as natural hard rubber, and in addition, it is resistant to many organic chemicals which attack natural hard rubber, soft rubber and plastics. It is resistant to oils. Tempron has high tensile strength, 7,500 psi, on a par with better plastics. It has a heat distortion temperature of 260-275° F. The company states that it also has excellent di-electric properties. Tempron is not just one formula. Rather it is a group of compounds which can be altered in many different ways to give just the right combination of physical, chemical and electrical properties for each specific application, American Hard Rubber maintains.

Flek Corp. Formed in California

The Flek Corp. has been formed at 2252 East 37th Street in Vernon, Calif., to specialize in the molding of "Kel-F" plastic parts. The company has just completed the installation of modern equipment for injection, transfer, compression and extrusion molding. Although the firm is equipped to mold all industrial plastics, it will specialize in molding Kel-F, a fluoro-chloro-carbon thermoplastic manufactured by the M. W. Kellogg Co. The new company has also installed equipment for the application of Kel-F dispersions, and for the electronic welding of plastic sheet and film into vessel liners and flexible containers of many types. Robert L. Cummer is president of the Flek Corp., while Jay W. De Dapper is general manager.

WASHINGTON APPOINTMENTS

Sidney T. Pruitt, Jr., Chicago regional manager for the Ethyl Corporation of America, has been appointed director of the Rubber, Chemicals, Drugs and Fuels Division of the Office of Price Stabilization.

Dr. Robert W. Cairns, assistant director of research for the Hercules Powder Co., has been named vice-chairman of the Research and Development Board, a staff agency of the Secretary of Defense.

Gamble Named Research Manager

David L. Gamble

The New Jersey Zinc Co., (of Pa.), Palmerton, Penna., has appointed David L. Gamble as manager of research succeeding George F. A. Stutz, who has been transferred to the New York offices as development engineer. Mr. Gamble was graduated from the University of Kansas in 1925 and took graduate work at Johns Hopkins University from 1928 to 1930. He joined New Jersey Zinc in 1925 and has held various positions in the Research Department since that time. Robert K. Waring has been advanced to assistant manager of research, the position formerly held by Mr. Gamble. Dr. Waring was graduated from Virginia Military Institute in 1924 and has obtained his doctorate at Johns Hopkins University in 1928. He has been in the Research Department of the company since 1928.

PCFA Standard Test Booklet

The Plastic Coatings & Film Association, New York, N. Y. has made available to manufacturers, jobbers and retailers the newly-adopted standard test methods designed to assist users of plastic coated and all-plastic materials in selecting the materials best suited to their individual requirements. The series of tests cover both pyroxylin and vinyl-coated fabrics and all-plastic sheeting to determine whether a particular material will meet specific strength, wear, handling requirements. Developed and compiled in booklet form by the Plastic Coatings & Film Association, these tests have been kept as simple and inexpensive as possible, within a practical range of accuracy, to make it worthwhile and practicable for as many purchasers of plastic fabrics as possible to equip themselves to carry out the tests. Just off the press, the booklet, "Standard Test Methods for Pyroxylin and Vinyl Resin Coated Fabrics and All-Plastic Sheeting," is available free of charge from the association, 9 Rockefeller Plaza, New York 20, N. Y.

Manufacturer? Supplier? Consultant? You may be entitled to a listing in the 1953-54 RUBBER RED BOOK. Contact us for information.

NAMES IN THE NEWS

DR. PHILIP R. MARVIN has been elected a vice-president of the Commonwealth Engineering Co. of Ohio, Dayton, Ohio, where he will head the Industrial Department.

JAMES J. MEENAN has been appointed manager of the Rubber Department of the Holland Colombo Trading Society, Inc., New York, N. Y.

GEORGE G. STIER, associated with the Nopco Chemical Co., Harrison, N. J., since 1932, has been appointed assistant vice-president of the company.

JOHN J. BECKER, well-known in the rubber field and former special consultant to the Rubber Division of the General Services Administration, has been appointed resident manager of the Akron office of Paine, Webber, Jackson and Curtis, investment and commodity firm.

EMIL O. JENSEN, associated with the Roth Rubber Co., Cicero, Ill., since 1950, has been named vice-president and general sales manager of the company.

GEORGE L. CURRAN, associated with the Dewey & Almy Chemical Co., Cambridge, Mass., since 1949, has been appointed field sales manager of the Shoe Products Division. WILLIAM F. MOTT, formerly sales manager of the division, has retired from this position but will act as consultant on advertising and promotion plans.

WILLIAM W. BELL, formerly associated with the Celanese Corporation of America as sales manager of the Plasticizer Department, has joined the Hatco Chemical Co., Harrison, N. J., as sales manager.

ROGER E. VAUGHAN, formerly assistant general manager of the Buffalo, N. Y., plant of the Farrel-Birmingham Co., has been named assistant general manager of the company's subsidiary, Consolidated Machine Tool Corp. at Rochester, N. Y.

HARRY E. WHITMORE has joined the staff of the Reilly Tar & Chemical Corp., Indianapolis, Ind., to promote the sales of products from their newly-formed Synthetic Organic Chemicals Department.

CLAUDE PITTS, associated with the Seiberling Rubber Export Co. since May, 1951, has been named vice-president and general manager of the company succeeding HARRIS A. WAITE, who recently retired after 24 years' service.

RALPH E. CLARRIDGE, associated with the Taylor Instrument Companies, Rochester, N. Y., since 1930, has been named chief engineer succeeding KARL H. HUBBARD, who has been named technical director.

EARL F. DAUGHERTY, formerly technical serviceman at Plant 2 of the Goodyear Tire & Rubber Co., has been named assistant to the vice-president in charge of production at the firm's plant at San Jose, Cuba.

MARCUS W. KEYES, formerly product development engineer for the Kimberly-Clark Corp., has been named sales engineer for the Fiber Glass Division of the Pittsburgh Plate Glass Co.

JOHN F. SHEA, formerly northeastern district sales manager of the Buffalo Electro-Chemical Co., Inc., and a member of the sales force since 1930, has been appointed general sales manager of the company.

SAM DUPREE, formerly assistant manager of the Industrial Products Division of the Goodyear Tire & Rubber Co., has been named assistant to R. S. WILSON, vice-president in charge of sales.

DR. RAY E. HEIKS, associated with the Battelle Memorial Institute for the past ten years, has been named to supervise the solid-state chemistry laboratories.

EDWIN EARL CALVIN, vice-president of the Bearfoot Sole Co., Wadsworth, Ohio, has been appointed a director of the company to fill the unexpired term of his father, the late EDWIN CALVIN.

D. M. RALEIGH, formerly associated with the B. F. Goodrich Co., has been named product manager of the Light Mechanicals Department of the Boston Woven Hose & Rubber Co.

WILLIAM F. WRIGHTNOUR, formerly director of training for the Tire Division of the U. S. Rubber Co., has been named assistant to the vice-president and general manager of the division. PATRICK H. KELLEY, formerly assistant director of training for the division, has been named director succeeding Mr. Wrightnour.

DR. GEORGE A. HARRINGTON, formerly associated with the Mallinckrodt Chemical Works, has been appointed market research director for the Indoil Chemical Co.

NATHAN W. DIAMOND, associated with A. C. Israel & Co., New York, N. Y., has been elected to the board of directors of the Commodity Exchange, Inc., to represent the Rubber Group.

HENRY M. WILLAND, formerly purchasing agent for the Los Angeles plant of the Goodyear Tire & Rubber Co., has been named purchasing agent for the Topeka, Kans., plant succeeding HENRY WATTS, who has been named purchasing agent for the Goodyear Atomic Corp., Portsmouth, Ohio.

FRED T. MARSHALL, associated with the B. F. Goodrich Co. for 34 years, has been named federal government relations director with headquarters in Washington, D. C.

JOHN L. COLLYER, president of the B. F. Goodrich Co., has been elected to the Executive Committee of the Business Advisory Council of the Department of Commerce.

DR. CYRIL G. VEINOTT, formerly associated with the Westinghouse Electric Corp., has joined the Reliance Electric & Engineering Co., Cleveland, Ohio, as consulting engineer.

THOMAS D. CABOT, executive vice-president of Godfrey L. Cabot, Inc., and vice-chairman of its board of directors, has taken leave from the company to serve as an industrial consultant to the Technical Cooperation Administration of the U. S. Department of State.

R. LINDLEY MURRAY, president of the Hooker Electrochemical Co., has been awarded honorary membership in the American Institute of Chemists.

O. W. ACHESON, formerly head of the Blower Division of the Lamson Corp., Syracuse, N. Y., has been appointed manager of manufacturing.

PHILIP C. STAPLES, associated with the Pennsylvania Salt Manufacturing Co. since 1937, has been appointed Chicago district sales manager of the Industrial Chemicals Department succeeding JOHN C. HAMPSON, who has been named Product Supervisor of the same department.

EDWARD J. STRUBE, formerly associated with the Bishop Manufacturing Corp., has joined the Rubber Laboratory of the Organic Chemicals Department, E. I. du Pont de Nemours & Co., Inc., where his work will include customer service with the wire and cable industry.

THOMAS D. BOLT, formerly associated with the Gates Rubber Co., has joined the staff of the Research and Development Department of Godfrey L. Cabot, Inc.

ERIC N. BLACKSTEAD, previously regional manager for the Ansbacher-Siegle Corp., has been elected vice-president and sales manager of the organization.

WARREN E. SCOVILLE, Jr., associated with the Development Department of the U. S. Rubber Co. since 1934, has been appointed assistant manager of the department.

CLINTON B. MCKEOWN, formerly technical superintendent of the Aeronautical Manufacturing Division of the B. F. Goodrich Co., has been named superintendent of the division.

ERIC NELSON, until recently associated with Molded Latex Products, Inc., Paterson, N. J., has joined Rubber Dipt Products, Inc., Yonkers, N. Y., as vice-president and treasurer.

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NEWS IN BRIEF

"Thy-mo-trol" (thyratron motor control) drive, what it consists of and how it operates, is described in two new four page bulletins announced by the General Electric Co., Schenectady 5, N. Y. GEA-5829 discusses ¾ to 3 hp applications, while GEA-5827 discusses ¾ to 10 hp applications.

A price reduction of approximately 10% on morpholine has been announced by the Carbide and Carbon Chemicals Co., New York, N. Y.

The *Saturday Evening Post* recently presented a plaque to the B. F. Goodrich Co., saluting the firm for 50 years of continuous advertising in that magazine.

The Industrial Brake Department of the Goodyear Tire & Rubber Co. is distributing an 8-page descriptive brochure which lists some of the many varied applications of the Goodyear airplane-type disc brake for industrial uses. Copies of "Industrial Disc Brakes by Goodyear" are available on request to the company.

Baldwin-Lima Hamilton Corp., Philadelphia, Penna., has issued a bulletin describing and illustrating new improved models of Baldwin 60-H and 12-H low-cost universal testing machines. Ask for Testing Machines Baldwin Bulletin 4204.

Dewey & Almy Chemical Co. has announced that it is producing dibutyl maleate for sale at 30c per pound in tank car quantities, marking the first time that this plasticizer has been offered by any supplier at this low price.

A new technical bulletin on "Formic Acid" which summarizes recent research on the uses of this chemical in the plasticizer, chemical, textile and other industries, has been published by the Heyden Chemical Corp., New York, N. Y.

A technical service report covering the uses and properties of Witco Stabilizer No. 90 has been made available by the Witco Chemical Co., New York, N. Y. Ask for Technical Service Report S-7.

What is said to be the first consumer warranty ever offered by a manufacturer of plastic upholstery is being offered by the Federal Leather Co. of Belleville, N. J. The warranty backs the company's leather-grained upholstery material, "Fedistron."

General Aniline & Film Corp., New York, N. Y., has announced the availability of a new 12-page bulletin on PVM (polyvinyl methyl ether).

Goodrich Chemical has published a new 2-page folder which outlines in a concise table the properties of Hycar rubbers.

Columbia-Southern Chemical Corp. has become the fifth nationally-known firm to join in support of the Graduate Institute in Silicate Chemistry and Related Sciences at the University of Toledo.

General Aniline & Film Corp., New York, N. Y., has reduced its development price of PVM (polyvinyl methyl ether) to 40c a pound. The product is being produced on a semi-commercial scale and further reductions are anticipated when commercial production is achieved.

Pratt & Lambert, Inc., Buffalo, N. Y., has developed a new synthetic rubber-base paint for cement and stucco. The alkali-resistant product is called "Alkalite."

Goodrich Chemical has issued a new Hycar Technical Newsletter dealing with Hycar 1043, a new low-temperature polymerized, medium-low acrylonitrile polymer. Ask for Issue No. 13.

The National Safety Council, Chicago, Ill., has issued an amusing new booklet covering highway and home safety hints. The booklet is entitled "Your 10,000-Mile Living Room."

A new 20-page catalog has been issued by the Sindar Corp., New York, N. Y., which offers complete information on the company's odors for industry, germicides and fungicides, stabilizers, antioxidants, and anti-skinning agents. Ask for Catalog No. 2.

Union Bay State Chemical Co., Cambridge, Mass., has made available a new brochure which marks the 50th anniversary of the company. The publication details the manner in which a chemical manufacturer equips his plant and controls production.

Bulletin 196, published by the Farrel-Birmingham Co., Ansonia, Conn., describes the company's "Z-Type" calender.

A new 16-page catalog describing its line of "Caricoal" conveyor belts has been published by Goodrich Chemical and is available on request.

Crossett Chemical Co., a division of the Crossett Lumber Co., Crossett, Ark., has begun operating a new plant for the production of high grade tall oil.

Kralastic is now undergoing extensive field testing as a substitute for bronze in water meter register boxes and covers by the Worthington-Gammon Meter Division of the Worthington Corp., Newark, N. J.

The Mechanical Goods Division of U. S. Rubber has published a general letter which gives general information about the Uscolite pipe manufactured by the company.

Builds New Research Facilities

Arthur D. Little, Inc., Cambridge, Mass., has announced that construction will begin in April on new, ultra-modern research facilities for the company in West Cambridge, Mass. It is expected that the new facilities will be ready for occupancy by the end of the year. The new building will be situated immediately adjacent to a building recently completed for the firm's Mechanical Division and occupied on January 1. The new building will be a two-story, E-shaped structure of almost 60,000 square feet. Present plans are that it will house the company's experimental operations in physics, chemical engineering, new product development, and production methods. Additional land is available for further expansion.

Brazil Rubber Output Increases

The Federal Rubber Credit Bank of Brazil has reported that rubber production in that country in 1952 reached 33,453 tons, a high for recent times. The 1952 production was 29.8% above the 1951 mark. The record high for rubber production in Brazil was 37,500 tons in 1912, before Brazil lost some of its market to Middle Eastern producers. Since World War II, the government has sought to encourage rubber production through subsidies and the establishment of small rubber plantations. Much of the previous rubber has come from wild trees. Unlike the days of the rubber boom, Brazil's own factories now consume all of the national production. In recent years it has even had to import some natural rubber.

Building Methanol Plant Jointly

Heyden Chemical Corp., and Monsanto Chemical Co. have entered into an agreement to build a methanol plant adjoining Monsanto's new acetylene facilities, located in Texas City, Texas. The methanol plant will use by-product gas from the acetylene operation. Heyden and Monsanto will share equally in the cost of construction and in the output of the plant which will have approximately 25 million gallons per year capacity. Commercial production will begin in January, 1955. According to the terms of the agreement between Monsanto and Heyden, the joint enterprise will continue for a period of years and provides for optional termination thereafter.

The first commercial production of dimethyl isophthalate has been announced by the Hercules Powder Co. It will be sold under the trade designation "DMI".

Fisher Scientific Co. has announced the availability of two laboratory-grade polymers of ethylene glycol, "P-165 Polyethylene Glycol 400, USP," and "P-166 Polyethylene Glycol 400, Stearate, USP." Both are available in quantities of one and five pounds.

How to increase the efficiency of powered industrial trucks is the theme of a new two-color booklet offered by the Elwell-Parker Electric Co., Cleveland, Ohio.

NEW POLYMERS AUTHORIZED BY OFFICE OF SYNTHETIC RUBBER, RECONSTRUCTION FINANCE CORPORATION

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Synthetic Rubber, Reconstruction Finance Corporation, since publication of those in our previous issue. Procedures for the distribution and sale of the polymers will be found in our October, 1945, issue. Normally, experimental polymers will be produced only at the request of the consumers and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside if possible for distribution to other interested companies for their evaluation. The 20 bales when available will be distributed in quantities of one or two bales upon request to the Synthetic Rubber Sales Division or will be held for six months after the experimental polymer was produced unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received to warrant them.

X No.	*Polymer Description*	*Remarks*
X-699 GR-S	A masterbatch of 25 parts Sundex 53 and 100 parts of a 20% bound styrene base polymer, rosin acid soap emulsified, sugar-free iron activated, 41° F. reaction temperature, 60% conversion, carbamate shortstop, Stalite stabilizer, salt acid coagulated. Mean latex Mooney viscosity 110 ML-4.	A slightly staining general purpose cold rubber oil masterbatch similar to X-696. *This polymer replaced by X-713 GR-S.*
X-700 GR-S	An oil masterbatch polymer described in the October, 1952, issue of RUBBER AGE.	
X-701 GR-S	Butadiene/styrene charge ratio 71/29 potassium stearate emulsified, amine activated, 50° F. reaction temperature, 80% conversion, carbamate shortstop. Average bound styrene of contained polymer 27.0%. Mooney viscosity of contained polymer 70-100 MS-4 @ 212° F. Total solids 35.0% min.	A cold latex for cord dip similar to X-617 latex except for higher conversion and higher solids. Latex *has been discontinued.*
X-702-SP GR-S	Same as GR-S-61-SP except shortstopped with carbamate and stabilized with Polygard.	GR-S-1018 replaced this polymer and the X-Number *has been discontinued.*
X-703-SP GR-S	Same as GR-S-66-SP except shortstopped with carbamate and stabilized with Polygard.	GR-S-1019 replaced this polymer and the X-Number *has been discontinued.*
X-704 GR-S	Same as GR-S-62 except shortstopped with carbamate and stabilized with Polygard.	GR-S-1009 replaced this polymer and the X-Number *has been discontinued.*
X-705 GR-S	Butadiene/styrene charge ratio 71/29 adjusted to yield 23.5% ± 1.0% bound styrene, fatty acid soap emulsified, persulfite catalyzed, 122° F. reaction temperature, 72% conversion, carbamate shortstop, Styphen I stabilizer, salt-acid coagulation, Mooney viscosity 46-54 ML-4.	This polymer similar to GR-S-1006 except for type of non-staining stabilizer. Polymer *has been discontinued.*
X-706 GR-S	An oil masterbatch description contained in the October, 1952, issue of RUBBER AGE.	General purpose oil masterbatch containing 37.5 parts Shell SPX processing oil.
X-707 GR-S	Identical with GR-S-1600.	Polymer replaced by GR-S-1600 and X-Number *discontinued.*
X-708-SP GR-S	Butadiene/styrene charge ratio 72/28 adjusted to give 23.5% ± 1.0% bound styrene, rosin acid soap emulsified, sugar-free iron activated, 41° F. reaction temperature, 60% conversion, carbamate shortstop, staining stabilizer, glue-acid coagulated. Polymer receives special finishing. Mooney viscosity 65-75 ML-4 A 212° F.	Replaces X-592-SP. Lower Mooney viscosity for easier processing and staining stabilizer for improved heat resistance during milling. Polymer designed for can sealing compounds, adhesives, etc.
X-709 GR-S	Oil masterbatch polymer described in the October, 1952, issue of RUBBER AGE.	General purpose oil masterbatch containing 50 parts Circosol 2XH processing oil. Polymer *discontinued.*

NEW POLYMERS AUTHORIZED BY OFFICE OF SYNTHETIC RUBBER (Cont'd.)

X No.	*Polymer Description*	*Remarks*
X-710 GR-S Latex	Butadiene/styrene charge ratio 70/30, fatty acid soap emulsified, amine activated, 50° F. reaction temperature, 70% conversion, carbamate shortstop. Average bound styrene of contained polymer 25.0%. Mooney viscosity of contained polymer 125-155 ML-4 @ 212° F. Latex heat concentrated to 58.0% minimum total solids.	High solids latex for foam sponge.
X-711 GR-S Latex	Polybutadiene latex, fatty acid soap emulsified, amine activated, 50° F. reaction temperature, 60% conversion, sodium or potassium mercaptobenzothiazole shortstop. Mooney of contained polymer 70-90 MS-4 @ 212° F. Latex heat concentrated to 60.0% minimum total solids.	A high solids polybutadiene latex designed for foam sponge. Being free of the odor characteristic of the butadiene-styrene copolymer latices, the latex is essentially odorless.
X-712 GR-S thru X-718 GR-S	Oil masterbatch polymers descriptions given in the October, 1952, issue of RUBBER AGE.	
X-719 GR-S	Similar to GR-S-1000 except N-tridecyl mercaptan used as modifier.	Polymer prepared to prove out suitability of mercaptan modifier prepared from N-tridecyl alcohol. *Polymer not available for general distribution.*
X-720 GR-S	Identical with GR-S-1000.	New standard polymer for use in testing carbon black according to Office of Synthetic Rubber Specifications.
X-721 GR-S	A masterbatch of 50 parts Sundex 53 processing oil and 100 parts of a cold base polymer. The base polymer: butadiene/styrene charge ratio 75/25 adjusted to yield 20.0% ± 1.0% bound styrene, 50/50 rosin/fatty acid soap emulsified, sugar-free iron activated, 60% conversion, carbamate shortstop, staining stabilizer, salt-acid coagulation. Mooney viscosity of masterbatch 45-65 ML-4 @ 212° F.	A 50 part oil general purpose oil masterbatch similar to X-709 GR-S except for Sundex 53 in place of Circosol 2XH, a staining stabilizer instead of Wingstay S and lower masterbatch Mooney.
X-722 GR-S	A masterbatch of 37.5 parts Circosol 2XH and 100 parts of a cold base polymer. Base polymer to be: butadiene/styrene charge ratio 75/25 adjusted to yield 20.0% ± 1.0% bound styrene, rosin acid soap emulsified, sugar-free iron activated, 41° F. reaction temperature, 60% conversion, carbamate shortstop, Polygard stabilizer, sale-acid coagulation. Mooney viscosity of masterbatch 45-65 ML-4 @ 212° F.	A 37.5 part Circosol 2XH, rosin soap oil masterbatch with a non-staining base polymer. Although Circosol 2XH is least staining of the processing oils presently used, masterbatch will be more subject to staining and discoloring than would the base polymer alone. *This polymer should replace X-717* for applications such as tire carcass and tread stocks, shoe soles, etc.

NOTE: The above new polymers are experimental only and the Office of Synthetic Rubber, Reconstruction Finance Corporation, does not make any representation or warranties of any kind, express or implied, as to the specifications or properties of such experimental polymers, or the results to be obtained from their use.

Drops Dipped Rubber Lines

Dewey & Almy Chemical Co., Cambridge, Mass., has announced that in order to concentrate its efforts within the Rubber Specialties Division on government orders for meteorological balloons, the company has decided to withdraw from the manufacture of dipped rubber consumer and industrial items upon completion of orders now on hand. The market for these items is limited, the company said, and the nature of the business does not fit in with the company's plans for future growth.

SE-550 Silicone Rubber

A new silicone rubber that bends without cracking even at —120° F. has been developed by the General Electric Co. especially for the aircraft industry. Called "SE-550," the material can be made into gaskets, fuselage equipment seals and wire insulation. It can also be used in military equipment designed for frigid zones. SE-550 also resists heat swell at temperatures up to 500° F. The company states that the new compound can be milled and extruded easily and resists tearing when pulled from a hot mold.

"Poly-Grip" Polyethylene Adhesive

A new adhesive, "Poly-Grip," has been developed by the Adhesive Products Corp., New York, N. Y. Poly-Grip makes it possible to adhere ordinary paper labels to polyethylene squeeze bottles and polyethylene containers. Conventional adhesives used for labeling will not adhere to polyethylene, the company states. For this reason, squeeze bottles have been stenciled or silk-screened, a process which is considerably more expensive than labeling. Poly-Grip is easily applied by conventional labeling machines.

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SPE HOLDS NINTH ANNUAL TECHNICAL CONFERENCE IN BOSTON, MASS.

A number of interesting and informative papers were presented at the Ninth Annual National Technical Conference of the Society of Plastics Engineers, Inc., which was held on January 21, 22 and 23, 1953 at the Hotel Statler in Boston, Mass. A full program of activities was provided, including a visit to a plastics plant, special luncheons and a grand dinner banquet and dance.

Among the papers presented at the conference was one by Gregory J. Azarian (American Brake Shoe) on "Mold Castings." The speaker gave a brief resume of the technical phase of precision casting. He also discussed the types of plastics articles for which molds are now being used.

Rene P. Magnenat (Waterbury Companies) also presented a paper at the conference entitled "Mold Design and Standardization." Mr. Magnenant divided his subject into three main classifications: alignment of mold halves; ejection; and supporting and resisting pressure, and discussed each of these.

"Engineering Design for Rubber Phenolics" was the title of another paper at the conference presented by A. P. Landall (G-E). The background of rubber-phenolic compounds along with their standard physical characteristics was briefly discussed. Mold design data was stressed, including mold shrinkage, types of molds for various applications with special attention to shrinkage, dimensional tolerance, warpage, and surface finishes.

With the aid of slides, the speaker illustrated the various points brought out in his talk by showing actual applications of rubber-phenolic molding materials, together with the design data which made them successful.

Large Mold Construction

L. T. Raymond (Major Mold & Die) chose for his subject, "Large Mold Construction." Mr. Raymond showed slides which outlined the various phases of large mold manufacturing. Each slide was discussed and questions from the floor answered.

"Tomorrow's Roll Surface Temperature Control and New Press Heating Systems," was the title of still another paper presented at the conference by Paul L. Geiringer (American Hydrotherm). Mr. Geiringer stated that the use of high temperature water for heating calenders and presses is increasing due to the current demand of the plastics industry for uninterrupted production of plastics films and coated fabrics of greater uniformity at increasingly high roll speeds. High temperature water permits maintenance of uniform surface temperatures, ease of temperature control, and ready adaptation of heating cycles as well as to the cooling cycles required when operating calenders at high roll speeds, he said.

Cracked rolls and loss of production time and material result from attempting to cool steam-heated rolls in water. The cost of conversion to high temperature water is coming down while the costs of using steam increase. It is not advisable to attempt the application of high temperature water without the advice of engineering organizations experienced in this field.

A new surface temperature control method is now available which avoids unreliable surface temperature indicators by making use of an indirect indication of the roll or platen surface temperature. This control device is motivated directly by the heat flow to or from the roll rather than by the surface temperature, thus providing greatly superior control in the heating, cooling, and especially the transition phases of calender and press cycles.

New Packaged Units Shown

New packaged units were shown, of the type now available for calender conversions to high temperature water. These units are inexpensive and more compact than heretofore, incorporating the benefits of considerable experience in plastics applications. The heat accumulation capacity of high temperature water is especially advantageous for press heating, reducing fluctuations in boiler load and in the time required for each cycle. Illustrations were presented showing the application of accumulators.

Frank J. Donohue (Monsanto), Sanford E. Glick (Monsanto) and Edward W. Vaill (Bakelite), representing the Professional Activities Committee of SPE, presented a few interesting papers at the conference. One of these was entitled "Basic Factors in Plunger and Transfer Molding." This paper offered a discussion of preheating techniques by radio frequency, infra red, steam oven, and dry oven methods. The discussion included preform sizes, density and positioning with a demonstration using radio frequency preheaters.

Among other papers at the conference was one by C. R. Giannotta (M. W. Kellogg) on "Techniques of Injection and Compression Molding Polytrifluoroethylene." M. S. Greenhalgh (G-E) delivered a paper on "Vinyl Compounding."

Cabot Introduces Sterling MT

Godfrey L. Cabot, Inc., Boston, Mass., has announced the production and commercial availability of its new thermal black, "Sterling MT", medium thermal grade. Sterling MT will be used primarily in the manufacture of mechanical and extruded rubber goods. Sterling MT is being produced at a new plant especially designed and constructed for the production of thermal types of carbon black. The plant is part of a multi-million dollar project begun by Cabot in 1952. Already built and in operation at the same location are a semi-reinforcing gas furnace black plant and an oil furnace black plant. Thus, from the same plant location, Cabot is able to offer a variety of special rubber grades of carbon black produced from either gas or oil by three separate processes for the specific use of the rubber industry.

Proposed Vinyl Standards

A Recommended Commercial Standard for General Purpose Vinyl Plastic Film is being circulated to the industry and the public for written acceptance, the Commodity Standards Division of the U. S. Department of Commerce announced recently. It is based on a proposal by the Society of the Plastics Industry and was modified to meet the desires of the majority at an industry conference on November 18, 1952. The Recommended Commercial Standard covers methods of test and requirements of general purpose plain or embossed vinyl plastic film to insure satisfactory products for consumer use. The requirements and methods of test specify thickness tolerances, yield per roll, width tolerances, shrinkage at elevated temperatures, contamination, appearance, cracking, tensile properties, tear resistance, volatility of plasticizer, water extraction, low temperature impact and flammability. Suggested forms for declaring compliance with the standard and an identifying hallmark are included. Mimeographed copies of the Recommended Commercial Standard, which is identified as TS-5165, may be obtained as long as the supply lasts by writing to F. W. Reynolds, Commodity Standards Division, U. S. Department of Commerce, Washington 25, D. C.

Firestone Scholarship Program

A scholarship award program for sons and daughters of employees of the Firestone Tire & Rubber Co. throughout the United States was recently announced by Harvey S. Firestone, Jr., chairman of the board. Each scholarship award will pay the cost of full tuition, fees and books and will offer a contribution to living expenses. Fifteen scholarships will be offered each year. Winners of the scholarships may attend any accredited college or university and will be given financial aid until they receive a college degree, providing they maintain a satisfactory record. To be eligible for a scholarship, a student must be in the upper half of his class and be the son or daughter of a Firestone employee who, as of June 1, 1953, has completed five years of service with the company, or whose parents had more than five years of service at the time of death or retirement. Deadline for all applications has been established as April 1. Dr. H. E. Simmons, president emeritus of Akron University, assisted in the development of the scholarship program, and will serve as Executive Director of the Firestone Scholarship Committee.

Named Union Bay State President

Union Bay State Chemical Co., Cambridge, Mass., has announced the election of Paul W. Atwood as president. Mr. Atwood was formerly vice-president and director of Stewart Douglas and Associates, Inc., management consultants in New York City. Roland D. Earle, formerly president and general sales manager of Union Bay State Chemical, has been appointed director of new product development for the company.

Harshaw Vinyl Stabilizers

Harshaw Chemical Co., 1945 East 97th St., Cleveland 6, Ohio, has introduced a new line of light and heat stabilizers for vinyl processors. Included in the Harshaw list of light and heat stabilizers are the following:

"12-V-5" and "128-V-5" (barium cadmium); These are effectively modified coprecipitated laurates for high heat and light stabilization. They are fine white powders.

"2-V-4" and "2-V-7" (cadmium); These are organic complexes for outstanding clarity. They are frequently used with barium and organic stabilizers. They are clear pale liquids.

"1-V-4" (barium); This is a white powdered high compatible barium compound. It does not bloom or plate-out of calendered stocks. It is said to improve viscosity stability in plastisols. It is frequently used with cadmium stabilizers with or without organic assistants.

"8-V-3" and "8-V-5" (organic); These are organic non-polymeric clear stabilizer assistants for use with barium-cadmium or cadmium stabilizers to further increase heat and light stabilizing efficiency.

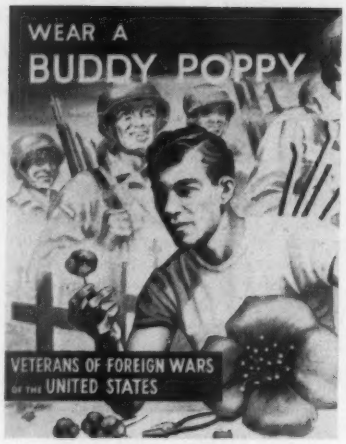
"7-V-1" (organic); This organic polymeric clear liquid is said to be particularly useful in extending heat stabilization. It is outstanding for organosols and solution applications and will extend many times the effectiveness of light stabilizers.

Introduces New Flooring Lines

New flooring lines recently introduced by the Goodyear Tire & Rubber Co. include a new corrugated rubber matting, and also a residential gauge rubber flooring. The corrugated matting is of high quality rubber, one-eighth inch thick. It comes in two colors, black and maroon, and in four widths: 24, 26, 48 and 72 inches. Economy plus new design, new quality and seven new styles are featured in the new residential gauge material, designed to meet the demands of the residential market for rubber flooring both for self-installation and for installation by dealers, with emphasis on the self-installation appeal. Goodyear has also announced a new color control system for its Wingfoot rubber flooring in tile form. A code marking system on cartons of the rubber tile will represent an organized production program for better quality control of the product. Goodyear also reports that demand continues far in excess of supply on the company's vinyl flooring line.

Baird Rubber Personnel Changes

Robert B. Baird, vice-president of the Baird Rubber and Trading Co., Inc., New York, N. Y., has assumed the duties of Harold W. Holcombe, who recently resigned as vice-president of the company. William A. Person has also resigned from the company and has returned to the aviation industry, in which field he was previously engaged for many years. Paul A. Mulach has joined Baird Rubber in an executive sales capacity. He was previously vice-president and general manager of Institutional Services, Inc., Brooklyn, N. Y.



More Names in the News

J. R. ALEXANDER has been appointed general sales manager of the Quaker Rubber Corp., Philadelphia, Penna., a subsidiary of the H. K. Porter Co., Inc.

JOHN BLAKE has been named manager of state and municipal sales for the Electrical Wire and Cable Department of the U. S. Rubber Co., while E. T. CORBUS has been named manager of electrical utilities sales for the same department.

A. T. FIORE, associated with Givaudan-Delawanna, Inc., for the past 20 years, has been named coordinator of new product development and service laboratories of the firm and its affiliate, the Sindar Corp.

W. J. DAUGHERTY, manager of the Mechanical and Special Goods Division of the Firestone Industrial Products Co., recently celebrated the completion of 40 years with the company.

J. A. NEUBAUER, technical director of the Columbia-Southern Chemical Corp., has been named to membership on the Technical Advisory Committee of the Graduate Institute of Silicate Chemistry and Related Sciences at the University of Toledo.

R. W. HOOKER, vice-president in charge of sales of the Hooker Electrochemical Co., Niagara Falls, N. Y., has been re-elected president of the Chlorine Institute, Inc., for the fifth consecutive time.

JOHN OTTENS, formerly associated with the Carl A. Lechner Co., has joined the Baker Castor Oil Co. as a sales representative working out of the Chicago office.

WILLIAM HAGEL and MAURICE P. SIEGER have been appointed to fill vacancies on the board of directors of the United Engineering and Foundry Co. Both are vice-presidents of the company.

Questionnaires for listings in the 1953-54 RUBBER RED BOOK are now in the mails. Forms should be completed and returned as quickly as possible.

FTC Cites Pigment Producers

The Federal Trade Commission has ordered five major lead pigment producers and affiliated companies to stop alleged banding together for the purpose of fixing prices to stifle competition. FTC issued to each company a "cease and desist" order. The parent companies involved are: National Lead Co.; Anaconda Copper Mining Co.; Eagle-Picher Co.; Sherwin-Williams Co.; and the Glidden Co. The five companies, FTC said, produce practically all of the lead pigments sold in the United States. In addition to ordering the companies to cease their alleged price fixing, the order also requires the National Lead Co. to refrain from strengthening its relative position in the lead pigments industry by acquiring any interest or ownership or control of any competitive firm engaged in the manufacture or sale of lead pigments. National Lead is the single largest producer of lead pigments in the U. S.

Officials of the National Lead Co. in replying to the FTC charges stated that there was no evidence to justify the agency's statement that it had violated the law in its methods of selling and distributing lead pigments. Spokesmen for National Lead said certain terms of the agency's order exceeded the commission's authority. It was stated that the company plans to make an appeal.

Stokes Molded Products Personnel

W. J. Dermody, engineering supervisor of Stokes Molded Products, Inc., Trenton, N. J., has announced a number of personnel changes at the company. Pat Avolio has been named material testing chemist for the company. The December, 1952, issue of RUBBER AGE incorrectly stated that Mr. Avolio had been named chief chemist. His appointment to this position was incidental to several other changes in the Engineering Department. Joseph Puglisi was named product engineer while Palmer Sanders was named development and research chemist. James W. Consolloy was named assistant chief engineer. Edwin Laning, in poor health for the past few months, has designed his position as research director. The revised organization does not include either a chief chemist or a research director.

Akron University Fellowships

Two $1,500 fellowships in rubber chemistry have been presented to the University of Akron by the Firestone Tire & Rubber Co. and the Goodyear Tire & Rubber Co. In addition to the cash awards, holders of the fellowships will be exempt by the university from tuition and other charges. Recipients are expected to complete work for the master of science degree. Initial awards for the fellowships will be made for the academic year, 1953-54, and applications may be obtained by writing Dr. Thomas Sumner, head of the Chemistry Department. Fellowship winners must devote a maximum of nine hours a week to the Chemistry Department as laboratory assistants and give first option on their services, for at least one year, to the company which presented the fellowship.

Goodrich Chemical Promotes Three

M. W. Osborne, Jr.

M. W. Osborne, Jr., has been named international sales manager, George B. Koch has been appointed advertising manager, and J. S. Wolff named agricultural chemical staff representative in a series of promotional moves at the B. F. Goodrich Chemical Co. Mr. Osborne, formerly advertising manager, succeeds O. E. Isenburg, who was recently appointed sales manager of Harmon Colors. A graduate of Illinois College, Mr. Osborne joined Goodrich Chemical in 1947. Mr. Koch was formerly agricultural chemical staff representative. He joined the company as advertising manager in 1948 and served in that post until 1950. He joined the General Chemicals Department in that year. He was graduated from Western Reserve in 1940 with a B.A. degree. Mr. Wolff, formerly Washington representative for the company, received his B.S. degree from the Carnegie Institute of Technology in 1940. He joined the company in 1946 as a development engineer. He joined the Sales Department in 1947 and in 1951 was appointed Washington representative.

G-E Expands Silicone Output

Expanded facilities for the manufacture of silicone materials to meet increasing industrial demands were put in operation recently at the Waterford, N. Y., plant of the General Electric Co. The company said that the expansion, costing in excess of $5,000,000, gives its Chemical Division a silicone production capacity comparable to any in the country. Coincident with the expansion of processing equipment, laboratory services have been doubled and employment is up 50% from a year ago. In announcing the opening of the new facilities, Dr. Charles E. Reed, general manager of the G-E Silicone Products Department, said that the additional capacity will help relieve current shortages of many silicone materials for defense and consumer industries.

New Offices for Badenhop

The Robert Badenhop Corp., formerly located at 233 Broadway, New York 7, N. Y., has moved to new quarters at 21 West Street, New York 6, N. Y., where it occupies the entire 29th floor. The telephone number is WHitehall 4-9260.

Midwest Rubber Elects Trimble

Gilbert K. Trimble was elected president of the Midwest Rubber Reclaiming Co., East St. Louis, Ill., at the annual meeting of the board of directors on January 9. Stephen G. Luther was elected vice-president, while Howard R. Painter was elected executive vice-president and treasurer. William H. Baker was named secretary and assistant treasurer. Harry H. Harris and Harold R. Stuteville were elected assistant secretaries. Stockholders of the company, at a prior meeting, named the following directors: William Welch, Mr. Luther, Mr. Trimble, R. R. Semler, T. W. Pettus, J. M. Olin, and H. W. Kroeger. Mr. Welch was named chairman of the board.

The company has also announced the appointment of Ray R. Semler as resident manager of the company's plant at Barberton, Ohio, and Charles D. Smith as chief engineer. Mr. Semler was associated with Midwest Rubber's predecessor firm, Akron Rubber Reclaiming Co., and worked on the original design, layout and construction of the East St. Louis plant. Since that time, he has been superintendent of the Barberton plant, factory manager for both plants, and chief engineer for the company. Mr. Semler is a director of the company. Mr. Smith received a B.S. degree in chemical engineering from Purdue University in 1937 and his master's degree in 1939. He was formerly associated with the Plastics Division of the Monsanto Chemical Co. During the past eight years, Mr. Smith had been in design engineering, plant maintenance engineering and division engineering on design and construction of new plant facilities.

1952 Activities of Ace Rubber

Floyd Snyder, president of Ace Rubber Products, Inc., Akron, Ohio, in a report on 1952 business, stated that total 1952 volume was up 6% over 1951, with the greatest December business in the firm's 12 year history. The Household Products Division was especially progressive, showing a 37% gain in 1952. Establishment of a Canadian subsidiary helped bolster company sales and promises to be an important factor in 1953 volume, Mr. Snyder said. William J. Worrell, sales manager of the company, stated that the introduction of the "Texto Tred" line of rubber stair treads and matting was largely responsible for the company's great sales increases in household goods.

URW to Decide Wage Goals

The Policy Committee of the United Rubber Workers, C.I.O., is scheduled to meet on March 13 and 14 in Cleveland, Ohio, at which time the group will decide what pay increases the union will aim for this year. In a letter to 300 union locals, L. S. Buckmaster, president of the URW, said that the program developed by the committee would spell out the demands to be made on industry in collective bargaining sessions this year. The Policy Committee, which meets each year to set economic goals, is made up of representatives of all URW locals.

Named General Sales Director

Fred V. Maloon

Fred V. Maloon, formerly manager of the New York office of the Boston Woven Hose and Rubber Co., Cambridge, Mass., has been named director of general sales for the company. For six years, ending in 1951, Mr. Maloon was in charge of factory sales and specifications for the company. In his new position he is charged with full responsibilities for the activities of the company's general sales organization. Mr. Maloon is a graduate of Dartmouth College and holds an M.B.A. degree from the School of Business Administration of Harvard University.

Plant Maintenance Show Held

The Plant Maintenance Conference held from January 19-22 at the Public Auditorium in Cleveland, Ohio, featured a roundtable discussion on "Maintenance in Rubber Goods Plants." This session was addressed by D. E. Engle, manager of maintenance and construction for the Firestone Tire & Rubber Co. In an address before this meeting, Mr. Engle stated that maintenance man hours per pound of finished products are increasing rapidly due to the use of automatic machinery. The need for intensive training of maintenance manpower is increasing he said, while this need of intensive training is decreasing in the production departments. The production craftsman, he noted, is rapidly becoming a machine operator and is requiring less and less skill as automation increases. Automation insists on specialization of manpower, Mr. Engle declared. The American Society of Mechanical Engineers and the Society for the Advancement of Management served as sponsors for the Plant Maintenance Conference.

Fidelity Promotes Faigenbaum

Fidelity Machine Co., Inc., Philadelphia, Penna., has announced the appointment of Roy Faigenbaum as vice-president in charge of sales, a position recently vacated by Howard Green. An engineer with Fidelity for many years, Mr. Faigenbaum has been closely associated with the development of precision machinery for the textile, rubber and wire industries and is responsible for many of the improvements on this equipment.

Raybestos-Manhattan Appointments

The board of directors of Raybestos-Manhattan, Inc., at a meeting held on January 21, made a number of important appointments. W. Ward Kievit was named treasurer of the company succeeding the late George R. Weber. Mr. Kievit, who is also comptroller and a director of the corporation, joined the Manhattan Rubber Division in 1917 and has held the office of chief accountant, auditor and secretary. William S. Simpson was named general manager of the Raybestos Division at Stratford, Conn., succeeding Robert B. Davis, who recently retired. Mr. Simpson, who is also secretary and a director of the corporation, joined the Raybestos Division in 1939 in the Sales Promotion Department. He has been director of personnel and assistant general manager of the division. Osborn H. Cilley was named general manager of the U. S. Asbestos-Grey-Rock Division at Manheim, Penna., succeeding the late Mr. Weber. He is also a vice-president and a director of the corporation who joined the Manheim organization in 1920 as plant superintendent. Since 1928 he has been assistant general manager of the division. S. R. Zimmerman, Jr. was named assistant general manager of the U. S. Asbestos-Grey-Rock Division. He joined the division in 1932 as industrial engineer and has been assistant sales manager and manager of automotive and industrial equipment sales for the division and a director of friction material research and development for the corporation.

Vinyl Film for Defense Use

The Federal Civil Defense Administration has asked the vinyl film industry for data on the availability of the plastic for use in covering doors and windows of emergency hospitals and aid stations in the event of an atomic attack. At a meeting sponsored by the Plastic Coatings & Film Association at the Hotel Commodore in New York City on January 27, Maurice T. Barnes, chief of the Equipment and Materials Branch, Engineering Division, Federal Civil Defense Administration, requested all producers to supply information on productive capacity of 4 gauge clear polyvinyl chloride film and normal inventories of all vinyl film 3 to 10 gauge, regardless of color, width or embossing. At present, Civil Defense is planning to acquire about 3,000,000 square yards of vinyl film for training purposes. It has been estimated, however, that 86,000,000 square yards will be needed for emergency covering of hospital and aid station windows in the event of attack.

Pearcy Joins Indoil Chemical

Evert Pearcy, formerly associated with the Sid Richardson Carbon Co., has been appointed eastern sales representative of the Indoil Chemical Co., Chicago, Ill., with headquarters in New York City. Harold Lorenz, previously associated with the Westvaco Chemical Division of the Food Machinery and Chemical Corp., has also joined Indoil Chemical. He will serve on the sales staff with headquarters in Chicago.

FINANCIAL NEWS

Dayton Rubber Co.

Year ended October 31, 1952: Net profit of $1,500,875, which is equal to $2.47 a common share, compared with $2,192,413, or $4.60 a share, in the previous fiscal year. Net sales in the 1952 fiscal year amounted to $54,023,245, exceeded only by the record $54,602,954 volume of the year ended October 31, 1951. As of October 31, 1952, total current assets amounted to $29,929,000, against $26,795,000 as of October 31, 1951. Total current liabilities stood at $6,960,000 at the end of the 1952 fiscal year, while at the end of the 1951 fiscal year total current liabilities were $8,562,000.

Midwest Rubber Reclaiming Co.

Year ended October 31, 1952: Net profit of $568,613, which is equal to $2.03 a common share, compared with $650,453, or $2.32 a share, in the fiscal year ended October 31, 1951. Sales in the 1952 fiscal year amounted to $7,296,378, against $9,620,597 in the 1951 fiscal year. Current liabilities as of October 31, 1952, totaled $1,227,583, while current assets were $2,649,928. At the end of the previous fiscal year, current liabilities were $2,171,972, while current assets were $4,031,873.

Lee Rubber & Tire Corp.

Year Ended October 31, 1952: Net income of $1,767,179, which is equal to $6.66 a share, compared with $2,185,632, or $8.62 a share in the previous fiscal year. Net sales in the 1952 fiscal year amounted to $45,335,579, against $50,402,406 in the 1951 fiscal year.

Boston Woven Hose & Rubber Co.

Quarter ended November 30, 1952: Net income of $45,123, which is equal to 7c a common share on sales of $3,966,237, compared with $230,489, or 61c a share, on sales of $5,412,728 in the corresponding quarter of the previous year.

Rome Cable Corp.

Nine Months to December 31, 1952: Net profit of $1,550,000, which is equal to $3.17 a common share, compared with $1,101,000, or $2.24 a share, for the nine months ended December 31, 1951.

Lea Fabrics, Inc.

Six Months to November 30, 1952: Net profit of $348,000, which is equal to $1.66 a share, compared with 285,500, or $1.36 a share, in the corresponding six months of the previous year.

Michelin and Co., Inc., New York, N. Y., has made available a newly revised data sheet which lists typical analyses for fourteen types of "Cachalot" brand cetyl oleyl, and stearyl alcohols, including NF, USP, technical and commercial grades used in the rubber processing industry.

Paisley Products Acquires Hayes

Paisley Products, Inc., of Chicago, Ill., a division of Morningstar Nicol, Inc., has purchased the Hayes Adhesives Co., St. Louis, Mo. The purchase included the assets of the firm, formulas, manufacturing processes and equipment at three separate locations in metropolitan St. Louis. The Hayes plants will be operated as an affiliate of Paisley Products whose operations have outgrown their present Chicago facilities. A large portion of their manufacturing will be transferred to the newly-acquired plants. Vernon Hayes, former head of the Hayes Adhesives Co., will continue as local manager of the St. Louis plants for the new owners. He will direct an expanded sales staff to bring improved distribution of the combined Hayes-Paisley line to an enlarged Southern and Southwestern territory. The Hayes firm, established in 1932 by Vernon Hayes and his brother Gerard Hayes, occupies more than 100,000 square feet of manufacturing space devoted to industrial and decorative adhesive materials. The St. Louis acquisition will also provide warehousing and distribution for Morningstar, Nicol products. Over-all supervision of the Hayes Adhesives Co. will be assumed by Murray Stempel, executive vice-president of Morningstar, Nicol and Paisley Products. Earl C. Lenz, vice-president and general sales manager of the Paisley operations will direct the combined sales staffs. Technical supervision of plants and laboratories will be handled by Sam Schuller, Paisley vice-president.

Shipping Carbon Black by Barge

Godfrey L. Cabot, Inc., has begun an experiment in supplying Akron rubber plants with carbon black by barge. A 600,000 cargo of carbon black was recently shipped by barge via the Mississippi and Ohio Rivers to East Liverpool, Ohio. If the experiment is successful, Cabot hopes to provide tire factories with overnight service from that city. Usually, it takes from 7 to 10 days when the black is moved in a routine manner by rail or truck from producing areas in Louisiana and the southwest. Cabot shipped the black from its Franklin, La., plant. The trip took 30 days to cover 1,951 miles. Cabot officials said that storage charges at East Liverpool would be offset by savings made possible with barge shipments. Substantial stocks at East Liverpool would offer the tire firms the reduced advantage of carbon black inventories, they said.

Lee Rubber Option Plan

Stockholders of the Lee Rubber & Tire Corp. at their annual meeting on February 26 will be asked to approve a stock option plan for officers and key employees of the company. The proposal includes authorization of 25,000 additional shares of capital stock for use in connection with the option plan, and stockholders will be asked to waive preemptive rights to such additional shares as are issued under the plan. Lee Rubber now has 265,199 shares of $5 par capital stock outstanding, with 34,801 shares of 300,000 authorized and issued held in the company's treasury.

IN AVIATION . . .

Another new advancement in aeronautical design. The world's first delta-wing jet seaplane, the Navy's Convair "Sea-Dart", launched recently in San Diego Bay.

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SYNTHETIC RUBBERS, SYNTHETIC RESINS, CRUDE RUBBER, HARD RUBBER SHEET, PLASTICS

NEW RUBBER PRODUCTS

Walt Disney Hand Puppets

Oak Rubber Co., Ravenna, Ohio, is now producing a new line of rubber hand puppets based upon characters created by Walt Disney for his new cartoon feature film, "Peter Pan." The company is also producing hand puppets based upon other Disney characters as well as puppets of

general interest. When worn like mittens with the thumb and little finger in the two ends and the middle fingers in the center, the Oak Rubber puppets "come to life" with a variety of amusing antics. Shown herewith is the new Peter Pan hand puppet.

Neoprene Mechanics Rubber

Tingley Rubber Corp., Rahway, N. J., has introduced the "Neoprene Mechanics Rubber" specially designed for men who wear overshoes on the job, and especially for those who work around oils, solvents, acids and other chemicals which damage ordinary rubbers. The overshoes are unusual in that they have no fabric lining. Field tests, according to the manufacturer,

have shown that ommission of the fabric exacts no sacrifice in durability. The new overshoes weigh only nine ounces apiece. Elasticity of the neoprene upper assures a firm grip on the shoe, so it won't pull off at the heel. Elimination of the liner also allows the upper to stretch permitting the wearer to use the same pair of overshoes for street and work in spite of the workshoe's larger size. Only three sizes are needed to fit virtually all shoe sizes, the company states.

Helicopter Using Dayton Cog Belt

The U. S. Army's new XH-26, one-man pulse jet helicopter now undergoing experimental phase tests, is utilizing cog belts manufactured by the Dayton Rubber Co., Dayton, Ohio, for power transmission. The new helicopter, designed primarily for observation and reconnaissance work for the Army, uses no gears or transmissions, but relies, instead, on a system of cog belts to transfer power from the mounted engines for stability purposes. In designing the system for application of a maximum performance belt drive, aeronautical engineers specified a belt that could carry more horsepower for its weight, size for size, be resistant to slippage on short centers over small pulley diameters and still be flexible for efficient operation. The Dayton Cog Belt met these requirements.

Air-Flate Baby Bottle Bouncer

Air-Flate, Inc., 47-11 Astoria Boulevard North, Long Island City 5, N. Y., has introduced the "Baby Bottle Bouncer," a new, inflatable novelty item especially designed to hold baby's bottle and keep it

from breaking. While primarily designed as a bottle rest, its attractive animal shape makes it double as a toy. Made of vinylite plastic, the unit inflates quickly to provide an air cushion for the bottle.

"Highflex" Sand Blast Hose

A new sand blast hose, said to be 15% lighter and 100% more flexible than others has been announced by the B. F. Goodrich Co. Called "Highflex," the new hose is built for all-around sand blast service. The braided hose is reinforced with a single braid of multiple strands of high tensile strength cotton cord and is made with an extra-thick, anti-static tube ¼-inch thick. The cover is heavy, black and abrasive resistant. Fifty foot lengths of the hose have rubber capped ends for longer wear. This prevents moisture from seeping into the hose end, swelling and rotting the fabric.

"Vina Lee" All-Vinyl Doll

Jay-Zee Doll Co., New York, N. Y., has introduced a new doll which is made completely of Marvinol vinyl resin. The vinyl compound contains a special non-toxic mixture making the doll completely harmless to children. The popular feature of the doll, called "Vina Lee", is the method of assembly of her limbs. Arms, legs and head are fitted into sockets but not cemented or strung into place, so that her limbs can be moved freely. No tools are used to assemble the parts so that when an arm or leg is pulled loose by rough treatment it can be slipped back into place. A metal

band is placed around the socket so that the part may be snapped back into place without pushing or prying and without danger of slipping out. Made completely of plastic, the doll cannot spring holes and drop straw or cotton stuffing around the house. The soft, hollow plastic keeps its shape yet gives the doll a warm, life-like, resilient feeling. Vina Lee is said to be the first all-vinyl doll manufactured completely by the injection molding technique. This technique was developed by Hungerford Plastics, Inc., of Rockaway, N. J. The special non-toxic vinyl compound used in the construction of the doll also was developed by Hungerford Plastics.

"Drivesall" Rayon Fabric Belt

A new rubber transmission belt developed by the B. F. Goodrich Co., Akron, Ohio, said to be the first ever made with all rayon fabric, is reported to be 25% stronger than cotton fabric belts made with the same number of plies. The new belt is also said to provide 10 times a greater flex life than its cotton counterpart. Called "Drivesall," the improved strength of the belt is due to the nature of the rayon filaments which are formed in continuous lengths, as contrasted with the short length fibers of cotton duck, the company says. Because rayon fabric plies are 30% thinner than cotton plies, they flex easier over small diameter pulleys and more plies can be used to make stronger, more flexible belts. A six-ply Drivesall belt is only as thick as a four-ply, 32 ounce cotton fabric belt. The new belt is designed for use on medium duty drives for fans, blowers, air compressors, pumps, machine tools, crushers, mills and for many special types of machinery in the rubber, printing, oil and paper industries.

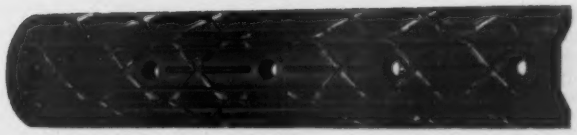
MOLDS FOR MODERN INDUSTRY

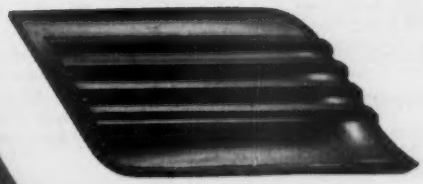
Molded Rubber Goods by the thousands come from pressure-cast Aluminum Cavities produced by The Akron Presform Mold Company. These Presform Cavities are entirely free from surface and interior porosity.

For extra durability, the heat-treated Cavities are assembled on a steel plate or in a steel container which carries the hardened dowel pins and bushings. Thus producing a Mold that will outlive many times the design of the article.

Presform Aluminum Cavities have been used in the Rubber Industry for many years and have produced the most simple and intricate parts of all descriptions.

Whatever Your Mold Problems May Be—Use Our Mold-Making Facilities.





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THE AKRON PRESFORM MOLD CO.

CUYAHOGA FALLS, OHIO

Makers of Molds for Rubber Items, such as —

Fender Guards and Transmission Covers, Accelerator Pads, Pedal Pads, Arm Rests, Air Mattresses, Mattress Valves and Plugs, Soles, Heels, Matting, De-Icers, "O" Rings, Bushings, Gaskets, Bulbs, Insulators, Grommets, Dolls, Play Balls, Cradle Toys, Juvenile Tires, Lawn Mower Tires and many Items in the Interest of National Defense.

FORMS	MOLDS	DIES	MACHINERY
LATEX - DIPPING	STEEL AND ALUMINUM	PLASTIC - INJECTION	SPECIAL - AUTOMATIC

Firestone Re-Elects Directors

All directors of the Firestone Tire & Rubber Co. were re-elected on January 17 at the annual meeting of stockholders in Akron, Ohio. Directors re-elected are: Harvey S. Firestone, Jr., Lee R. Jackson, John J. Shea, James E. Trainer, Raymond C. Firestone, Harvey H. Hollinger, Leonard K. Firestone, Roger S. Firestone and Joseph Thomas. At the meeting of the board of directors following the meeting all officers were re-elected and H. M. Taylor was elected vice-president in charge of manufacturers sales. Officers re-elected are: Harvey S. Firestone, Jr., chairman; Lee R. Jackson, president; John J. Shea, vice-president, finance; James E. Trainer, vice-president, production; Harold T. Tompkins, vice-president, trade sales; Raymond C. Firestone, vice-president, research; Harvey H. Hollinger, treasurer; Joseph Thomas, secretary and general counsel; Claude A. Pauley, comptroller; Elton H. Schulenberg, assistant treasurer; William D. Zahrt, assistant treasurer; Henry S. Brainard, assistant secretary; Timothy F. Doyle, assistant comptroller; and Lawrence A. Frese, assistant comptroller.

3M Plans Research Expansion

Minnesota Mining & Manufacturing Co. has purchased a 125-acre tract in St. Paul, Minn., for a long-range building program for research purposes. Plans call for the housing of many of the firm's major research projects on the tract. The first unit in the multi-million dollar development will be a $3,000,000 laboratory for the company's Central Research Department. Construction of this unit will start this spring. It will be completed in the fall of 1954. Company officials stated that there is no fixed timetable for erecting additional laboratory buildings on the new site. The tract was acquired, however, to provide room for ultimate expansion of company research facilities.

Kitchener Group Hears Vodra

The January 6th meeting of the Kitchener Rubber Group, held at the Dominion Tire Office Canteen in Kitchener, Ont., Canada, featured an address by V. H. Vodra of the Wyandotte Chemicals Corp., Wyandotte, Mich. Mr. Vodra spoke on the "Economics of Compounding." His address was similar to one he presented before the October 16th meeting of the Quebec Rubber and Plastics Group under the title "Practical Compounding for Economy." A report of this meeting and an abstract of Mr. Vodra's paper appeared in the November, 1952, issue of RUBBER AGE.

Eagle Rubber Co. Expands

Eagle Rubber Co., Ashland, Ohio, is constructing a new addition to its factory. The new addition is a brick, steel and concrete structure which will provide more than 10,000 square feet of space. New equipment is being installed and the new facilities will be in operation in the near future. Expansion of the plant facilities was necessary to accommodate increased production.

LOS ANGELES NEWS

Stauffer Chemical Co., in a move to simplify its corporate structure, has merged two of its operating divisions, Western Molded Products, Inc. and the Pacific Hard Rubber Co., into the Western-Pacific Container Division. Stauffer Chemical, as the surviving corporation, has succeeded to all of the properties and rights and has assumed all of the obligations of the companies eliminated as a result of the merger. The Western-Pacific Container Division of the Stauffer Chemical Co. maintains headquarters at 824 Wilshire Blvd., Los Angeles, Calif., with factory and warehouse facilities at 3211-15 East 23rd St. in Los Angeles.

Two new courses to be given by Dr. Harry L. Fisher at the University of Southern California in the spring semester of 1953 were recently announced. Dr. Fisher was recently named director of the TLARGI Rubber Technology Foundation, sponsors of the courses in rubber technology. The first of the announced courses, Chemical Engineering 528, Rubber Technology III, is a graduate course on recent developments in chemistry, structure, and technology of natural and synthetic rubbers with historical background. The course carries a credit of 3 units. The second of the courses, Chemical Engineering 490a, Special Problems, carries a credit of 2 units. This is an undergraduate course on natural and synthetic rubbers — their chemistry, compounding, testing and technology. Recent developments in the rubber industry will be included for discussion.

At a meeting of the board of directors of the Kirkhill Rubber Co. on December 29, 1952, T. Kirk Hill, founder and president of the company resigned as president and was elected chairman of the board. William J. Haney was elected to succeed him as president of the firm. Mr. Haney stated that there will be no changes in policies or personnel of the company.

Tom Sauters has been named manager of the Western Division of the Dill Manufacturing Co. succeeding Harry Baker, who has been named assistant manager of sales with headquarters in Cleveland, Ohio.

Ray Taylor has been appointed works manager of the Patterson-Ballagh Division of the Byron Jackson Co. succeeding J. Workman, who was transferred to the parent company.

Golden State Rubber & Latex Corp., formerly located at 657 East 61st St., Los Angeles 1, is now in its new factory at 1538 West 132nd St., in Gardena, Calif.

The West Coast Division of the Durethene Corp. is now located at 5600 W. Arbor Vitae Street, Los Angeles 45. The telephone number is Oregon 9-4969.

Boston Meeting Paper Deadline

April 16th has been set as the deadline for abstracts of papers to be presented before the second Spring Meeting of the Division of Rubber Chemistry of the American Chemical Society which will be held in Boston, Mass., from May 27 to 29. All abstracts should be in the hands of the secretary, C. R. Haynes, Binney & Smith Co., 41 East 42nd St., New York 17, N. Y., by that date. Abstracts should be in triplicate and about 200 words in length describing the research and giving a general summary of results. With these abstracts should be a statement of (1) the laboratory in which the work was done, (2) the author or authors (one of whom must be a member of ACS), (3) who will deliver the paper, and (4) time required for presentation. Three copies of the finished paper are to be handed to the secretary at the time of the meeting. H. W. Sutton (Boston Woven Hose) is in charge of the meeting as local chairman.

No. California Group Meets

The Northern California Rubber Group met on January 15th at the Berkeley Elk's Club in Berkeley, Calif. The meeting featured an address by Hart Eastman, assistant secretary of the East Bay Municipal District, who showed a film of the water purification program of the East Bay. A general discussion was also held regarding club policy for the year. Russell D. Kettering (Oliver Tire) was appointed chairman of the Membership Committee for the ensuing year. The February 12th meeting, also scheduled to be held at the Elk's Club, was to have featured an address by Jack Morrill (Shell Chemical) who was to have spoken on "Structural Application of Epon Resin." A report on this meeting will appear in a future issue of RUBBER AGE.

Borden Forms New Sales Unit

A new sales group for packaging adhesives has been set up by the Borden Co. as a result of further expansion by its Chemical Division into varied chemical products. Raymond J. Lodge has been named sales manager for the group which has been set up to handle sales of adhesives to paper converters, label industries, cigarette manufacturers and other users of packaging adhesives. The new group was formerly part of the division's Specialty Department which now includes wet-strength resins for paper manufacturing, stabilizers for latex paints, tile cements and solvent cements.

Scrap Rubber Institute to Meet

The Scrap Rubber Institute of the National Association of Waste Material Dealers, Inc., will meet on March 16th at the Conrad Hilton Hotel in Chicago, Ill., in conjunction with the 40th Annual Convention of the parent society which is being held on March 16 to 18. Speakers participating in the convention will be announced shortly. Special programs have been scheduled for the convention including luncheons, dinners, the annual banquet and dance.

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experience

A Quarter-Century of engineering know-how and manufacturing experience has resulted in the constant superiority of Pelletex over all other standard grades of SRF carbon black. Its excellent pellet quality and remarkable physical and chemical properties have made it the SRF Standard of the entire carbon black industry. No SRF carbon black can match the uniform, exceptional performance of Pelletex. No manufacturer of SRF carbon black has a better record of company service than...

CABOT **The GENERAL ATLAS Carbon Co.**

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PELLETEX

CANADIAN NEWS

The 36th Annual Conference of the Chemical Institute of Canada will be held in Windsor, Ont., on June 4, 5 and 6. Outstanding industrialists and scientists will present papers at the technical sessions and special functions. Technical subjects to be covered by the speakers will include rubber, protective coatings, chemical engineering, analytical chemistry, physical and organic chemistry and other interesting topics. Among special events will be the presentation to an outstanding Canadian scientist of the Chemical Institute of Canada Medal and the Western Memorial Lecture. At the annual business meeting on June 4, names of new officers for 1953-54 will be announced.

The Protective Coatings Division of the institute has scheduled two one-day conferences on March 12 in Montreal and March 13 in Toronto. An identical program will be presented in both cities. A highlight of the conferences will be a panel discussion on "Laboratory Tests for Paint." Chairman of the panel will be C. M. Skinner (Sherwin-Williams) with a panel of five authorities drawn from industry and government. A number of interesting and informative papers have been scheduled for the conferences.

Don McKenzie, formerly associated with the Naugatuck Chemicals Division of the Dominion Rubber Co., Ltd., has joined R. M. Ferguson & Co., Toronto, Ont., in a sales capacity. Mr. McKenzie served with the R. C. A. F. during World War II and joined Naugatuck Chemicals in 1946, covering Ontario on rubber and industrial chemicals.

Canadian Industries, Ltd., has selected Edmonton as the site for Canada's first polyethylene plant. A $13,000,000 installation is planned. The plant, scheduled for production late in 1953, will turn out eight times the amount now available in Canada through imports from the United States and Britain.

W. H. Funston, president of the Firestone Tire & Rubber Co. of Canada, Ltd., recently charged that Canadian tires are too highly taxed. Taxes currently include a 10% sales levy and a 15% excise tax. Mr. Funston stated that the excise tax is discriminatory and that it is difficult to see any justification for such a high levy on an article so vital to transportation.

Godfrey L. Cabot, Inc., Boston, Mass., has announced that the personnel of Delacour-Gorrie, Ltd., has joined its Canadian company, Cabot Carbon of Canada, Ltd. It is planned that the latter company will be producing oil furnace blacks early in 1953 at Sarnia, Ont. The Canadian company will also act as sales representatives for all Cabot carbon blacks, plasticizers and pine products manufactured by the parent company.

Don McKenzie
Joins R. M. Ferguson & Co. at Toronto in sales capacity.

A Canadian grand jury has returned an indictment against a number of rubber companies charging them with conspiring amongst themselves and with others "to unduly prevent or lessen competition." The firms charged include the Goodyear Tire & Rubber Co. of Canada, Ltd., the Dominion Rubber Co., the Dunlop Tire & Rubber Goods Co., Ltd., Gutta Percha & Rubber, Ltd., and the B. F. Goodrich Rubber Co. of Canada, Ltd. The indictment, which the grand jury endorsed as a true bill, charges the companies in connection with the manufacture and production of such goods as belting, fire and garden hose, and printing and rubber covered rolls.

Evan W. Hayter, formerly marketing and advertising manager of the Goodyear Tire & Rubber Co. of Canada, Ltd., has been named managing director for Canada by McCann-Erickson, Inc., international advertising agency.

Western Tire Auto Stores Sold

Sale of the controlling interest of Western Tire Auto Stores, Inc. of Chicago, Ill., to Associates, Inc., Minneapolis, Minn., was recently announced. The purchase price was reported to be slightly in excess of $3,000,000. Western Tire operates forty-six retail stores, most of which are in the Chicago area. It services forty-nine associated stores in the Middle West. Ira H. Handelman, president of Western Tire, said that he will retain all real estate owned by the company and lease it to the new management. At a meeting of the new stockholders, Clarence T. Gibson was elected president and director of Western Tire. Paul Coen, former general manager of Western Tire, was elected a vice-president and director, and P. N. Johnson was elected secretary and treasurer. Associates, Inc., is a newly-formed investment group.

Opens Scott Service Center

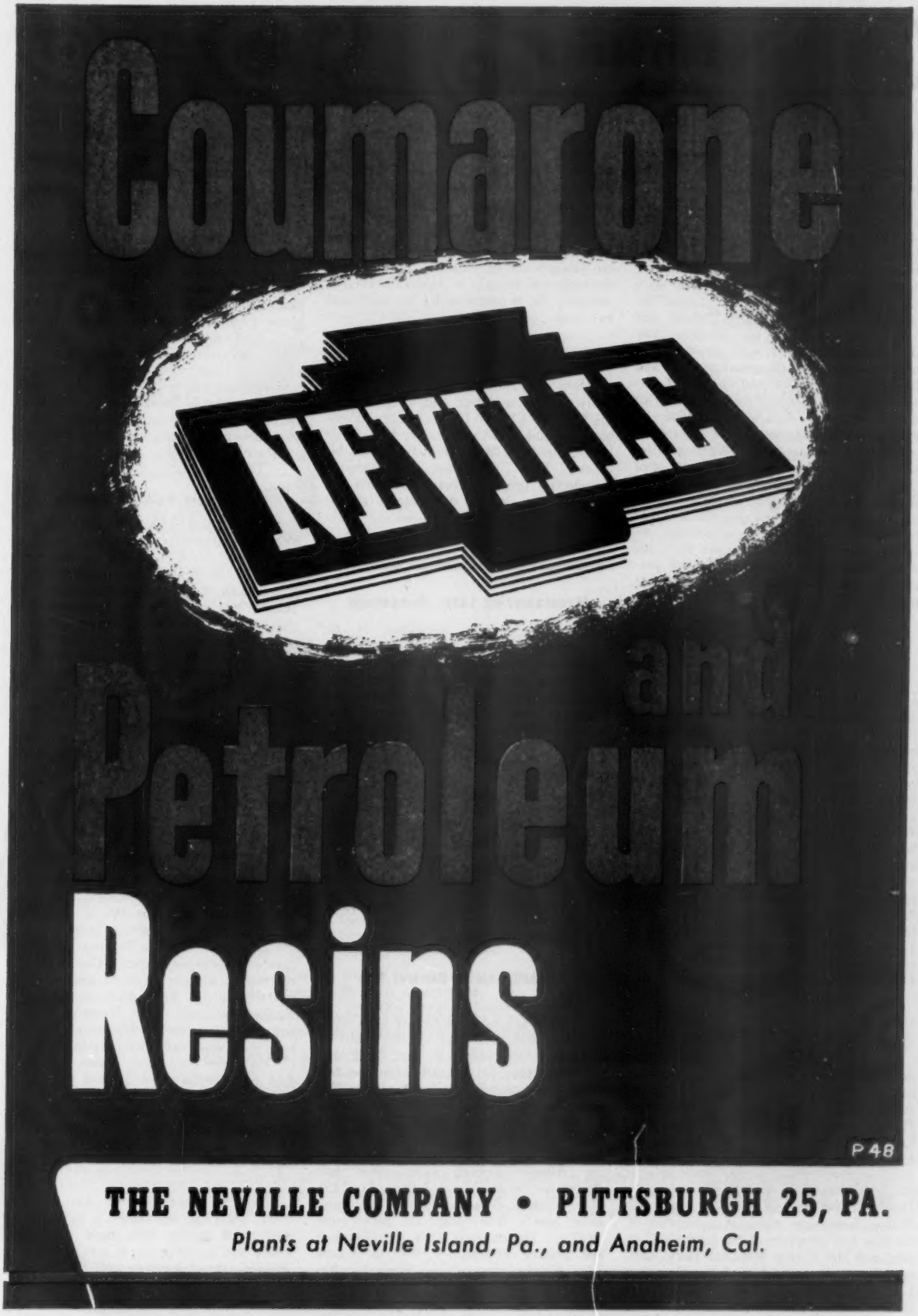
Scott Testers, Inc., Providence, R. I., has announced the appointment of Scott Testers (Southern) Inc., 216 Reidville Road, Spartanburg, S. C., as the authorized source of servicing, repairs, supplies and parts for Scott testing equipment used in textile mills and other industries in the Southeast. The appointment is effective as of March 1, 1953. Scott Testers (Southern) will maintain a complete stock of factory made parts and supplies. Its facilities include a machine shop capable of completely rebuilding Scott testers. The establishment is under the direction of John Hargreaves and will be staffed with factory-trained personnel available to travel to mills or other installations for such servicing as can be done there—or for transporting equipment to the shop for servicing, rebuilding and modernization. Conversion of existing equipment to the new Scott "Accr-O-Meter" Constant Rate of Extension Weighing System can also be accomplished by this personnel. It is emphasized that Scott Testers (Southern) will devote its activities to furnishing service, parts and supplies for existing installations. This arrangement in no way affects the status of John Klinck of North Augusta, S. C., who for many years has represented the company. Present policies and representation will be retained with reference to sales of new equipment and engineering assistance to customers and prospective customers on new problems concerning physical testing.

Dritz Vinyl Plastic Tapes

John Dritz and Sons Co., of New York, N. Y., has developed two new Marvinol plastic tapes which a housewife can use in the making of her own vinyl shower curtains. The first Dritz tape is 1½ inches wide and has a coating of adhesive vinyl which makes a tight bond with a light application of heat. It comes inset with metal eyelets and is used as a heading for the shower curtain. This tape is fairly heavy gauge and transparent. The second tape is also transparent but is only ¾ inch wide and is used for seaming the vinyl plastic curtain. It can also be used to make and mend tablecloths, curtains, coverings and other plastic articles for the home. The products are being marketed under the trade names "Plasti-Mend Shower Curtain Heading" and "Plasti-Mend Tape." They are made from Marvinol vinyl resin produced by the Naugatuck Chemical Division of the U. S. Rubber Co.

ASTM Plans Committee Week

The American Society for Testing Materials will hold its annual Committee Week during the week of March 2, 1953, at the Hotels Statler and Tuller in Detroit, Mich. A few meetings will also be held at the Sheraton-Cadillac Hotel in Detroit. According to the preliminary schedule, Committee D-11 on Rubber and Rubber-Like Materials will meet on March 4 and 5 at the Tuller Hotel and on March 6 at the Hotel Statler. The SAE-ASTM Technical Committee on Automotive Rubber will meet on March 3 and 4 at the Hotel Tuller.


Coumarone
NEVILLE
and
Petroleum
Resins
P48
THE NEVILLE COMPANY • PITTSBURGH 25, PA.
Plants at Neville Island, Pa., and Anaheim, Cal.

OBITUARIES

Edwin Calvin, Sr.

Edwin Calvin, Sr., chairman of the board of the Bearfoot Sole Co., Wadsworth, Ohio, died on January 6 at St. Luke's Hospital, Cleveland, Ohio. Mr. Calvin was born in Nashville, Ind. on May 12, 1890, and was graduated from Harvard College. For many years he was connected with the leather industry in Boston, Mass., and was connected with the England-Walton Leather Co. at the time he, with his brothers, Ernest and I. B. Calvin, founded the Bearfoot Sole Co. in February, 1924. As president and sales manager, he pioneered rubber and fiber soles for shoes and developed designs and styles leading to the popularity of rubber soled footwear. In 1945, he was seriously injured in an automobile accident and relinquished his duties as sales manager. He remained president until 1952, at which time he was succeeded by his brother, I. B. Calvin. Edwin Calvin, Sr. was an accomplished musician and nature lover and pursued these hobbies until his death. Surviving are his wife, his son, Edwin Earl, vice-president and personnel manager of the company, and three brothers and two sisters.

Calvin Provost

Calvin Provost, who retired as vice-president and a director of the Bloomingdale Rubber Co. of Chester, Penna., in 1946, died on November 20, 1952, at his home in Marydel, Del. He was 78 years old. He started his career in the rubber industry in 1887 with the American Hard Rubber Co. at Butler, N. J. In 1890, he joined the Bloomingdale Soft Rubber Works at Bloomingdale, N. J., which was later reorganized and named the Bloomingdale Rubber Co. In 1910, Mr. Provost was named factory manager of the company, and in 1926 was elected vice-president and director. Funeral services were held on November 21 with interment in Chester Rural Cemetery, Chester, Penna., on November 22. He is survived by his wife, a son and five daughters.

George R. Weber

George R. Weber, vice-president, treasurer and a director of Raybestos-Manhattan, Inc., and general manager of its U. S. Asbestos Division plant at Manheim, Penna., died on January 14 at his home in Lancaster, Penna. Mr. Weber became affiliated with the U. S. Asbestos plant in 1921 and took an important part in creating the Raybestos-Manhattan merger in 1929. He was also an officer of Appel and Weber, Lancaster jewelers; a member of the board of directors of St. Joseph's Hospital and the Fulton National Bank, both of Lancaster; a member of the Hamilton Club and the Lancaster Country Club, and the Everglades Club, Palm Beach, Fla.

Otto J. Kuhlke

Otto J. Kuhlke, who with his brother, the late M. D. Kuhlke, founded the Kuhlke Machine Co. in Akron, Ohio, died of a heart attack on January 26 at his home in Oakland, Calif. The Kuhlke company was later merged into the National Rubber Machinery Co. Funeral services were held on January 29 in Oakland, after which the body was brought to Akron for further services. He is survived by his wife and two sons.

Henry H. Robinson

Henry H. Robinson, who retired two years ago as treasurer and a director of the National Electric Products Corp., Pittsburgh, Penna., died on January 9 in Pittsburgh. In 1905, Mr. Robinson assisted his brother, W. C. Robinson, in organizing the electric products company, which has grown to be one of the nation's largest manufacturers of electrical wiring products.

Manufacturing Latex Compounds

Wica Co., Inc., of Charlotte, N. C., manufacturers of textile specialties and former distributor of latex compounds for the textile and allied trades, have completed the installation of machinery and equipment for the manufacture of their own latex compounds. Manufacturing capacity of the new facilities is said to be one of the largest in the Southern area. William C. Caldwell, Jr., is president and sales manager of the Wica Co. Willis N. Moore, formerly associated with the Alco Oil & Chemical Co., has joined the Wica staff to head the development and control laboratories. Mr. Moore has also been associated with the Latex Research Department of the Firestone Tire & Rubber Co. and with the General Latex & Chemical Co.

Kimball Rejoins General Tire

Dan A. Kimball former Secretary of the Navy, has been re-elected as a vice-president and a member of the board of directors of the General Tire & Rubber Co. The election took effect on his resignation January 21 as head of the Department of the Navy. The resignation of Lewis L. Strauss as a director also was announced. Mr. Strauss, a New York banker and a former member of the Atomic Energy Commission was elected to the board on August 21, 1950. Mr. Kimball returned to the company after nearly four years of government service. He resigned as a vice-president and director on March 9, 1949, to become Assistant Secretary of the Navy for Air. He later became Under Secretary and then Secretary.

Norwegians Surveying Industry

Nine representatives of Norwegian management, labor and government arrived in Akron, Ohio on January 29 on a survey of the manufacturing techniques of the American rubber industry. Their American study is being sponsored by the Mutual Security Agency under its productivity and technical assistance program. MSA, in cooperation with the Rubber Manufacturers Association, Inc., has arranged a six-week tour that will give the team an opportunity to observe production methods in 11 United States plants in New Jersey, Massachusetts and Ohio. The Norwegians are also scheduled to inspect rubber laboratories and research centers and meet with labor officials. Specific attention will be given to the manufacture of automobile tires and tubes, bicycle tires, hose, conveyor and transmission belts, heels and soles, and foam rubber products. Norway has 14 rubber manufacturing plants employing a total of 3,000 workers. The largest plant employs about 1,000 workers. Annual rubber consumption in the country approximates 5,000 tons.

Reclaimers Re-Elect Officers

At the recent annual meeting of the Rubber Reclaimers Association, Inc., in New York, N. Y., all officers were re-elected. F. E. Traflet (Pequanoc Rubber) is president of the organization and G. K. Trimble (Midwest Rubber Reclaiming) is vice-president. Charles T. Jansen (RUBBER AGE) is secretary-treasurer. The 1952 board of directors were also re-elected at the same meeting. Members of the board are: R. E. Casey (Naugatuck Chemical), Irving Laurie (Laurie Rubber Reclaiming); C. R. Shaffer (Xylos Rubber), D. S. Morse (Bloomingdale Rubber), and Mr. Trimble. Jean H. Nesbit (U. S. Rubber Reclaiming) was re-appointed chairman of the association's Executive Committee.

Hardesty Firms Announce Merger

Announcement was made on January 1, 1953 that Hardesty Chemical Co., Inc. has been merged into W. C. Hardesty Co., Inc. and will operate henceforth as the Hardesty Chemical Division of W. C. Hardesty Company, Inc. The firm will continue to operate from its present headquarters at 41 East 42nd Street, New York, New York. Mr. Howard M. Abbott, vice-president of Hardesty Chemical has been appointed vice-president of W. C. Hardesty Co., Inc. Other personnel will continue in their present capacities. Products of the merged corporation will include its present lines of Century Brand fatty acids and glycerine, together with Harflex plasticizers, sebacic acid and capryl alcohol.

Riverside Manufacturing Co., Woodstock, Va., has introduced a lightweight, waterproof tackle belt made of Velon which fits securely on a man's belt and which is snugly fitted with nine watertight plastic vials and a watertight cigarette and match container.

THE HISTORY OF THE RUBBER INDUSTRY — Number 1

how long did it take to get from here to here?

Answer: Two Years

Rubber fire hose first helped relieve the bucket brigade at Fresh Wharf, during the famous London Fire in 1827! The manufacture of rubber fire hose was begun in Manchester, England, just two years earlier, in 1825. Its inventor is reported to be Thomas Hancock, who started the first rubber factory in England in 1820.

In the United States, the manufacture of rubber fire hose was started in Boston, about 1847.

Monsanto Chemical Company was founded in 1901, and has since helped write history with the Rubber Industry.

Monsanto has long been a leader in rubber chemicals research. It has made regular important contributions to rubber progress, including developments of value in processing of natural, synthetic and reclaimed rubber.

Research facilities of Monsanto are available to the rubber industry. If you have a problem in rubber compounding or rubber research, we hope you will feel free to discuss it with us. For further information, get in touch with MONSANTO CHEMICAL COMPANY, Rubber Service Department, 920 Brown Street, Akron 11, Ohio.

MONSANTO CHEMICALS FOR THE RUBBER INDUSTRY

ANTIOXIDANTS
Flectol* H
Santoflex* B
Santoflex BX
Santoflex 35
Santoflex AW
Santowhite* Crystals
Santowhite MK
Santowhite L

ALDEHYDE AMINE ACCELERATORS
A-32
A-100

MERCAPTO ACCELERATORS
Santocure*
El-Sixty*
Ureka* Base
Mertax (Purified Thiotax)
Thiotax (2-Mercapto benzothiazole)
Thiofide* (2,2' dithio-bis benzothiazole)

GUANIDINE ACCELERATORS
Diphenylguanidine (D. P. G.)
Guantal*

ULTRA ACCELERATORS FOR LATEX, ETC.
R-2 Crystals
Pip-Pip
Thiurad* (Tetramethyl-thiuram disulfide)
Ethyl Thiurad (Tetraethyl-thiuram disulfide)
Mono Thiurad (Tetramethylthiuram monosulfide)
Methasan* (Zinc salt of dimethyl dithiocarbamic acid)
Ethasan* (Zinc salt of diethyl dithiocarbamic acid)
Butasan* (Zinc salt of dibutyl dithiocarbamic acid)

WETTING AGENTS AND DETERGENTS
Areskap* 50
Aresklene* 375
Santomerse* S
Santomerse D

SPECIAL MATERIALS
Thiocarbanilide ("A-1")
Santovar*-A
Santovar-O
Sulfasan R
Insoluble Sulfur "60"
Retarder ASA

COLORS
REODORANTS

*Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS — PLASTICS

Serving Industry... Which Serves Mankind

BAIRD RUBBER
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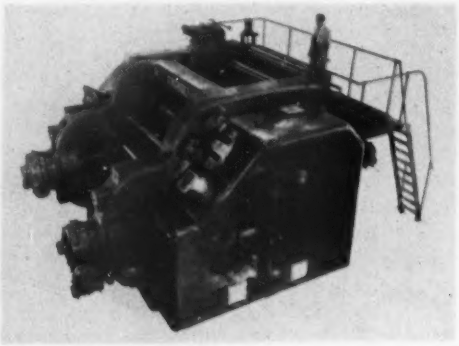
233 BROADWAY, NEW YORK 7, N. Y.
WOrth 4-1460
FOR DEPENDABLE SERVICE ON ALL YOUR RUBBER REQUIREMENTS

NEW EQUIPMENT

Giant F-B "Z" Calender

A giant "Z" calender, equipped with four 36 x 92-inch rolls, has been built by the Farrel-Birmingham Co., Inc., Ansonia, Conn., for a manufacturer of thin vinyl films. Part of a complete train from Banbury mixers to winder, the calender is geared for maximum production



speed of 158.8 yards per minute. It is driven by a 700 h.p., direct-current motor.

A design feature which provides several worthwhile operating advantages for this machine is the arrangement for material feed through the bottom roll pair. This gives the operator a direct view of the material bank, no rear-view mirror is required, and the first pass is more accessible for feeding. The second pass can likewise be more easily observed, and access is also easier to the final pass rolls for starting the material for threading through the cooling train. In addition, it is possible for the operator to stand directly underneath the top side roll where he can check the action of the pick-off roll and the embosser, which is an integral part of this calender.

The embossing unit is designed so that its rolls are as close as possible to the last calender roll to minimize loss of heat in the material before embossing. A tempering roll is also provided to restore heat to the film before it reaches the embossing roll.

The four calender rolls, which are 92 inches in face length and 36 inches in diameter, are the heaviest ever installed in a "Z" calender. They are made of high-quality chilled iron, equipped with high-pressure rotary joints, drilled longitudinally beneath the surface for the passage of temperature controlling fluid, and ground to extreme accuracy for both concentricity and roll shape.

The proportions of the rolls give them great stiffness and they are precisely ground to compensate for deflection under load. For adjustment for deflections to suit various film gauges in the final pass, a special device is provided for the top side roll. This is a motorized arrangement for crossing the axes of the two top rolls. This adjustment is used to effect changes in roll crown to offset deflection to the exact degree required for a substantial range of film gauges.

Among other standard features of design that contribute to the unusual precision of this calender is the "Z" arrangement of the rolls. With only two rolls in

any plane there is no pressure from a third roll to affect roll settings and cause fluctuations in gauge. Important also are hydraulic pullback cylinders which effectively hold the rolls in their operating positions, completely eliminating backlash in the boxes and adjusting screws. Extremely fine roll adjustment is facilitated by individual motorized units for each end of the three movable rolls. These operate by push-button through the high-ratio worm reductions. The roll ends can be adjusted independently or in synchronization.

The calender is equipped with a flood-lubricating system complete with pump, oil sump and heat exchanger. The journal boxes are full-lined, water-cooled, and provided with high-temperature oil seals to prevent leakage of lubricant. It is arranged for variable speed operation over a range of 16 to 158.8 yards per minute, the maximum speed being considerably greater than chemical limitations at present permit.

Harper-Velan Self-Tightening Valve

A new valve, said to represent a major advance in steel valves for high pressure and high temperature power service, has been introduced by the Velan Engineering Co., 1 Exchange Place, Jersey City, N. J. Called the Harper-Velan Self-Tightening Valve, it is reported by the company to overcome several disadvantages inherent in ordinary valves.

According to Velan Engineering, steel valves used at present generally have integral hard-faced welded seats directly on the valve body, and in most cases have to be discarded when the seat becomes unserviceable. Valves with renewable seats screwed into the body are not advisable as they often develop leaks through the threads. Another general disadvantage in present valve design, states the company, is the danger of possible leakage when the valve is closed tight at elevated temperatures and becomes less tight as it cools off due to wide and repeated temperature variations.

In the Harper-Velan valve, a combination seal and seat disc was used to overcome these disadvantages. The disc is pressure-loaded on the differential area when the valve is closed and it also permits a slight downward movement during the closing action of the valve. If, on the other hand, the seat is closed and the valve cools off, the seat ring automatically follows the valve disc and assures absolute tightness to compensate for repeated temperature variations. In addition, the valve has a reversible seat and disc, the unused portion of the disc being held in reserve and protected against wear. Thus, in a sense, two valves are offered for the price of one.

A special modification of its standard Hydrolair unit has been developed by the Elmes Engineering Division of American Steel Foundries, Cincinnati 29, Ohio. The new **light-weight plastic molding press** has a 30-ton capacity and is equipped with air-operated pushback cylinders for powered ram return. One of the new units is especially designed for continuous production of molded cord and plug sets for electrical appliances.

Memo to Rubber Manufacturers: Be sure to return questionnaires promptly for listings in the 1953-54 RUBBER RED BOOK.

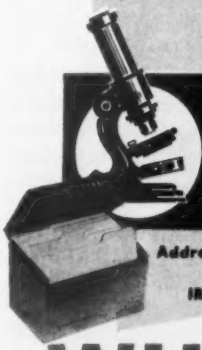
everybody talks
QUALITY
R-1599 R-2199 R-2899
. . . these Pure Light Red Iron Oxides by Williams assure it!

They represent the ultimate in red iron oxide colors for the rubber industry.

Williams iron oxides come to you with all the benefits of our 72 years in the pigment business . . . and as a result of our experience in producing pure red iron oxides to specifications of the leading rubber companies.

Each is manufactured to rigid specifications for copper and manganese content, pH value, soluble salts, fineness, color, tint and strength by controlled processes and with special equipment. *The result is absolute uniformity of product.*

If you haven't already done so, try these finest of all iron oxide colors. Your own tests will show there is no equal for Williams experience.



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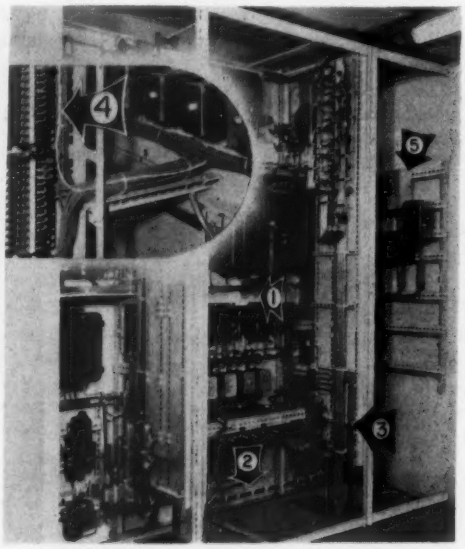
Control Panel Developments

Instrument and control engineers in various industries, including the rubber manufacturing industry, have long demanded more instruments at no increase of operating space or sacrifice of maintenance ease. Recognizing this need, the Bailey Meter Co., of Cleveland, Ohio, put its panel design engineers to work on the



project as far back as 1947. The results illustrated and described here represent an analysis of several hundred control panel installations.

Illustrated herewith is the rear view of a typical automatic control panel incorporating the newest developments in panel design and construction as engineered by the Bailey Meter Co. The following advancements are numerically keyed to the panel illustration:

(1) Complete accessibility now provided through the utilization of vertical support areas. These are systematically spaced and divide the panel into bays of associated instruments and operating lines.

(2) Control room floor openings and external tubing and wiring conduits may be completed well in advance of panel installation. Panel bay widths are easily determined once the major instruments have been selected and located.

(3) Tubeways have been created to provide centralized distribution points. Panel tubing is concentrated on sturdy vertical supports designed to carry all necessary instrument control lines and meter pressure lines from remote points to panel mounted instruments.

(4) Wireways enclose well-marked, compact, but easily accessible electrical terminal blocks. Installing, testing, and tracing procedures by user can now be done in a minimum of time and with least possible inconvenience or error. Additional terminals may be added without obstruction to existing facilities. Individual wire bundles are now carried out of wireways at points nearest to instrument and switch terminals.

(5) Adjustable wall racks facilitate mounting of any make control boxes, alarms, relays, breakers, etc. This construction also permits installation of additional equip-

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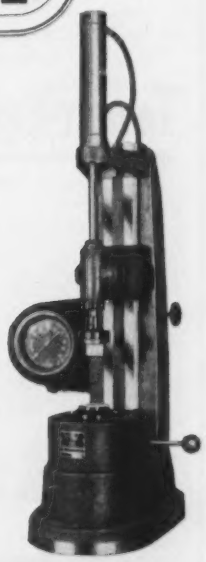

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ment without welding special mounting pads to panel walls. Old method of welding caused charring of panel walls both inside and out, thus necessitating refinishing and repainting either all or sections of panel walls.

In the panel shown, approximately 12 square feet of additional equipment and tubing may be mounted without affecting the accessibility to instruments and controls. Construction technique provides the same strength as conventional type panels, yet affords flexibility which was never before realized.

High Capacity Impulse Steam Trap

A new impulse steam trap for use where condensate must be handled in unusually large quantities has been developed by the Yarnall-Waring Co., Philadelphia 18, Penna. The new trap, known as the Series 50 Yarway Impulse Steam Trap, is a companion to the Series 60 and 120 traps made by the company to meet standard trapping requirements in all types of plants. The basic operating principle of the new impulse trap is the same as that employed in the Series 60 and 120 types. It employs a hinged lever and two valves mounted on a valve seat plate, and the control flow which governs opening and closing action of the valves is obtained by allowing small clearance between inlet and outlet valves and their respective seats when the lever is at rest. An example of the maximum capacity of the new Series 50 traps is 17,300 pounds of condensate per hour for the 1½-inch size at 100 pounds gage, based on condensate 30° F. below steam temperature.

Designed specifically for use with resins, clay, powders and other light "flooding" materials generally difficult to handle, the new **Thayer Filling Scale** automatically holds, fills, checkweighs and releases up to 6 bags of material a minute within weight tolerances of plus or minus two ounces or less of any desired weight from 25 to 200 pounds. It is a product of the Thayer Scale & Engineering Corp., Rockland, Mass.

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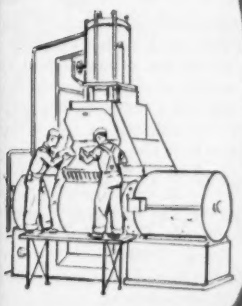

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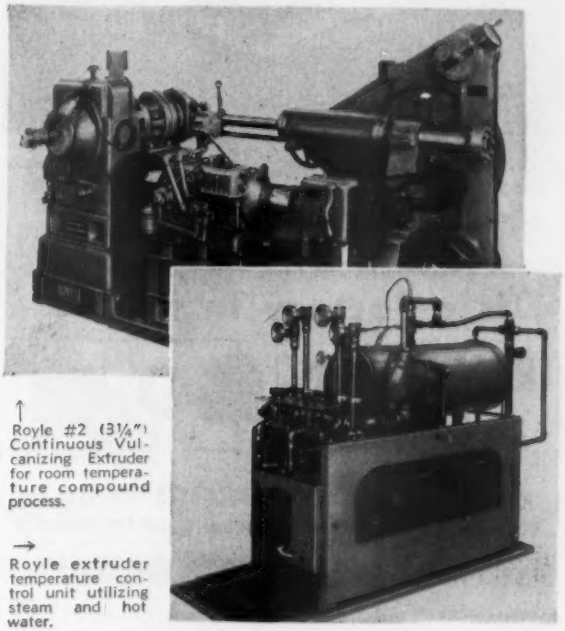
The room temperature compound process and associated equipment recently developed by the Western Electric Company, Incorporated, offer nine important advantages. These advantages begin with the storage of completely mixed, ready-to-extrude, rubber, GR-S, or Neoprene compounds and extend to a smoother and improved appearance for the finished product.

The complete extruder vulcanizing portion of the room temperature compound process is available to insulated wire producers* from John Royle and Sons who, for seventy-two years, have been building extruding machines to meet the most exacting process requirements.



↑ Royle #2 (3¼") Continuous Vulcanizing Extruder for room temperature compound process.

→ Royle extruder temperature control unit utilizing steam and hot water.

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- Reduction in compound scrap
- Reduction in electrical faults
- Permits storage of completely mixed compounds
- Permits more economical scheduling of mixing equipment
- Eliminates "warm-up" operation
- Possible mill-room economies
- "Hot" machines may be converted
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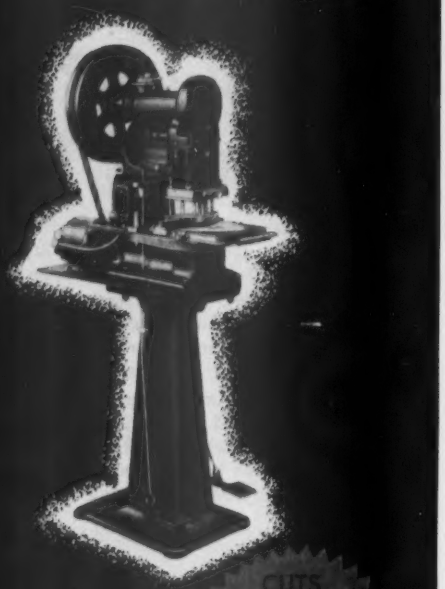

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REVIEWS

BOOKS

Adhesion and Adhesives. Edited by N. A. De Bruyne and R. Houwink. Printed in the Netherlands. Distributed by Elsevier Press, Inc., 402 Lovett Blvd., Houston, Texas. 6¼ x 9½ in. 518 pp. $10.00.

Representing the work of a number of outstanding specialists, this book collects in one volume comprehensive information about the scientific and technological aspects of adhesion. To secure a degree of uniformity, the editors first arranged for the more theoretical part to be written and then circulated it to the authors of the technological section. The result indicates that the solution of the practical problem of adhesion need not be on entirely empirical lines.

The book has nine chapters in all, devoted to the following subjects: (1) General Conditions for Wetting and for Adhesion; (2) Molecular Forces; (3) Rheology of Adhesives; (4) Static Problems; (5) Organic Adhesives; (6) Inorganic Adhesives and Cements; (7) Rubbery Adhesives; (8) Adhesion in Soldered Joints; (9) Physical Testing of Adhesion and Adhesives. The list of contributors is impressive, including A. J. Staverman, J. Hoekstra, Earl D. Cornwell, William M. Lee, John H. Wills, G. Salomon, and W. R. Lewis. Specific chapters were also contributed by the co-editors. Author and subject indexes are included.

•

Symposium on Determination of Elastic Constants. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna. 6 x 9 in. 100 pp. $2.00.

In recognition of the need for more accurate knowledge of known elastic constants and their extension to extreme temperatures, as well as the need for new techniques covering such relatively new materials as plastics and composite materials, a series of five papers was presented at the 1952 Annual Meeting of the A.S.T.M. under the auspices of the Task Group on Elastic Constants of Committee E-1 on Methods of Testing. These papers are reproduced in this booklet which also includes an analysis of returns from a questionnaire on the needs regarding elastic constants and on current practice in their determination. The papers cover an ingenious method for modulus determinations at elevated temperatures and its application to steels, static and dynamic methods for non-metals, the advantages and limitations of dynamic methods, and a comparison of values of elastic constants for a beryllium-copper alloy obtained by several static and dynamic methods.

•

Maleic Anhydride Derivatives. By L. H. Flett and W. H. Gardner. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 6 x 9 in. 270 pp. $6.50.

This book consists of a simplified presentation of 116 different types of chemical reactions involving maleic anhydride or one of its simple unsaturated derivatives. The reaction is given whether it takes place with maleic acid, fumaric acid, their esters, amides or other unsaturated derivatives. Each reaction selected has been treated as the representative of a particular type and the reactions are grouped into chapters according to the elements contained in the compound reacting with the maleyl group. Each preparation is confined to a set of two open pages, with the net equation and a brief description of the method appearing on one page and comments, a description of the reaction products, and possible uses given on the other. The busy investigator who likes to browse through chemical reactions for thoughts to stir his creative imagination will find this book of particular interest.

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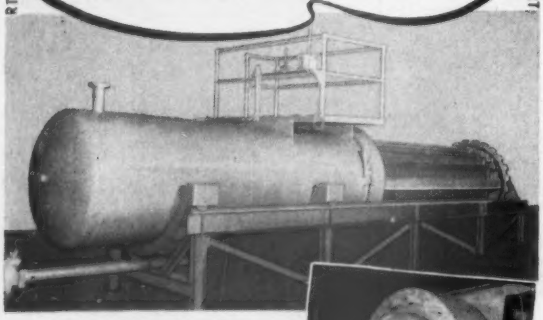

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REVIEWS (CONT'D)

Plastics Molding. By John Delmonte. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 6 x 9 in. 494 pp. $9.00.

This book offers a carefully planned analysis of the plastics molding industry and its equipment, as well as the principles and accessories that permit a molder to attain a high degree of versatility. Approaching his subject from an engineering viewpoint, the author first considers the flow of materials and then launches into a discussion on techniques for handling these materials once the flow has been properly established. Maximum emphasis is placed on the selection and adaptation of equipment to molding problems. One chapter is devoted exclusively to plant instrumentation and another to plant layout. The book has 16 chapters in all, and has both author and subject indexes.

•

Chemicals of Commerce: 2nd Edition. By Foster Dee Snell and Cornelia T. Snell. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, N. Y. 6 x 9 in. 520 pp. $6.50.

Completely revised and brought up to date for handy reference, this book presents all the principal facts about commercial chemicals from abalyn to zirconium oxide. It includes the new chemicals, new developments and new materials of recent years, and gives practical data on thousands of chemical materials, each carefully chosen for its commercial importance. Although some technical language has necessarily been used, an attempt has been made either to define terms or to limit them to those which are familiar to any one with an elementary knowledge of inorganic and organic chemistry.

•

Handbook of Engineering Fundamentals. (2nd Edition). Edited by Ovid W. Eshbach. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 5½ x 8½ in. 1324 pp. $10.00.

Thirty-nine outstanding scientists contributed to this completely revised reference book, widely known for its thorough coverage of all phases of engineering. The discussions on mathematics, thermodynamics, and fluid mechanics have been entirely rewritten or revised and similar treatment has been given to the sections on electricity and magnetism, engineering materials, and engineering law. A new section on aerodynamics stresses theory basic to the design and performance of aircraft. The list of contributors reads like a "who's who" of the engineering profession.

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SEE PAGE 562

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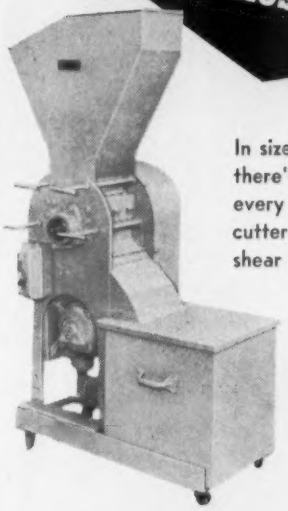

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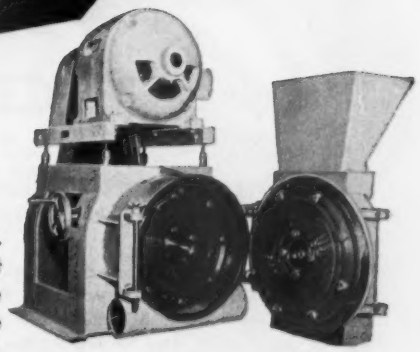

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BOOKLETS, CATALOGS, etc.

Neoprene Latex Foam. (Report No. 52-2). By R. N. Conklin and J. C. Carl. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Delaware. 6¼ x 9½ in. 56 pp.

The properties of neoprene foam products are described in this report which also includes comparisons with foam made from other elastomers. Compound formulas and processing methods are presented for the preparation of both slab and molded products. The report is divided into three main sections, the first dealing with properties of neoprene foam, the second with preparation of neoprene foam, and the third with equipment for foam processing and testing. Specific formulas are given in an appendix which also includes data on treatments for flame resistance and sodium silicofluoride solubility. Of special interest in the appendix is a comprehensive list of patents covering latex foam sponge, grouped by subject.

•

Molded Products and Coatings. The Franklin Institute, Benjamin Franklin Parkway at 20th St., Philadelphia 3, Penna. 6¾ x 9¾ in. 16 pp.

Some of the activities at the Franklin Institute Laboratories for Research and Development of practical importance to many industries are outlined in this booklet. Specific fields of research are stressed, including rheology, reaction kinetics, stress analyses, diffusions and permeabilities, wetting and adhesion, polymers, and special properties. Apparatus used at the laboratories for these various fields of research are briefly described and illustrated. The fields covered are those of direct interest to the manufacturers and users of molded products and coatings and the materials that go into their composition.

•

The Aniline Story. National Aniline Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 6¾ x 10 in. 12 pp.

This brochure gives the history of aniline, believed to be man's first commercial synthetic organic chemical, and describes its many present uses and future possibilities. Among applications mentioned in the brochure are those connected with drugs, medicines, photographic film, rubber products, rocket fuel, and seed disinfectants. According to the brochure, over 125,000,000 pounds of aniline are now being produced annually, the equivalent of nearly a pound for every man, woman and child in the United States.

•

Honeywell pH and Conductivity Recorders and Controllers. (Catalog No. 1550). Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44, Penna. 8½ x 11 in. 24 pp.

This new catalog describes and gives details on measurement and control of pH, Redox, and conductivity. It includes easy-to-understand theory behind electro-chemical measurement and gives up-to-date information on recorders, controllers, amplifiers and electrodes. It also contains information on where and how to use automatic pH, Redox, and conductivity measuring and controlling equipment. The catalog is profusely illustrated.

•

Pittsburgh Chemicals. Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Penna. 8¼ x 11¾ in. 12 pp.

A brief listing of the principal products of the company, including coal chemicals, plasticizers, activated carbons, protective coatings, and agricultural chemicals, is given in this booklet. Product specifications are shown wherever possible, along with an indication of the more important uses and applications of the products. A number of the products covered are of direct interest to the rubber and plastics industries.

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- Natural and Synthetic Latex Compounds
- Plastisols

RC PLASTICIZERS

- Dibutyl Phthalate — (DBP)
- Triethylene Glycol Dicaprylate — (TG-8)
- Di-iso-octyl Phthalate — (DIOP)
- Di-iso-octyl Adipate — (DIOA)
- Iso-octyl Palmitate — (O-16)
- Iso-octyl Iso-decyl Phthalate — (ODP)

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DIVINYLBENZENE (20% and 40% grades) in synthetic rubber manufacture improves processing and decreases shrinkage of the product. With styrene and other monomers, it produces insoluble and infusible copolymers.

STYRENE MONOMER can be polymerized with other active olefinic materials to produce a variety of synthetic rubbers having various properties.

Di-tert-BUTYL-meta-CRESOL is suggested for use in the preparation of hard rubber or ebonite from GR-A synthetic rubbers. It is reported to improve tensile strength of ebonite and increase tackiness of the stock. Sulfides of DBMC have been reported to be effective peptizing agents for reclaiming of GR-S type synthetic rubbers.

MONO-tert-BUTYL-meta-CRESOL has been reported to be an effective anti-flex cracking agent in rubber and rubber-like materials. The resin obtained by condensation of MBMC with formaldehyde has been shown to impart tack to GR-S rubber.

TECHNICAL BULLETINS AVAILABLE

For further information on any of the above chemicals, write for the Technical Bulletin on the chemical (s) in which you are interested. Please address: Koppers Company, Inc., Chemical Division, Dept. RA-23, Pittsburgh 19, Pa.

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REVIEWS (CONT'D)

Pliolite S6-B in Soles and Heels. Chemical Division, Goodyear Tire & Rubber Co., Akron 16, Ohio. 8½ x 11 in. 24 pp.

The special advantages of Pliolite S6-B, a styrene-butadiene copolymer of high styrene content, in heels and soles are emphasized in this technical report. Properties of the resin are presented in detail and its effect in rubber is graphically illustrated. General information on processing and compounding hot, cold and oil-extended GR-S is given. Formulation-wise, data for high, medium and low-grade soles is tabulated, and special formulations are given for innersoles, black soles, and oil-resistant soles, as well as for the production of leather-like goods in general. Test methods used in connection with the physicals shown are detailed in the report.

•

Witco Stearates. (Bulletin No. 53-1). Witco Chemical Co., 260 Madison Ave., New York 16, N. Y. 8½ x 11 in. 32 pp.

All stearates manufactured by the company, including aluminum, cadmium, calcium, lead, lithium, magnesium, sodium and zinc stearates, as well as special soaps, are discussed in detail in this technical bulletin. The various industries in which these compounds find application and the characteristics of the compounds which fit them for each application are covered both generally and specifically. Government specifications of metallic stearates are listed as to grade, specification number, and use. Also included are the analytical tests used, a guide to the company's other products, and a list of the technical service reports which relate to the company's stearates and special soaps.

•

Philblack E in Natural and Synthetic Rubbers. Philblack Sales Division, Phillips Chemical Co., Bartlesville, Oklahoma. 8½ x 11 in. 16 pp.

Application of Philblack E, the new super abrasion furnace black, in natural and synthetic rubber compounds is detailed in this technical report. Typical properties of the new black are outlined, including particle size, surface area, pH, volatile matter, and specific gravity, and compared with those of Philback O and an EPC black. Data is furnished on 27 typical compounds, with physicals given in each instance in both tabular and graphical form. Special data is included on cold rubber treads for 8.00x15 passenger car tires.

SEE PAGE 562

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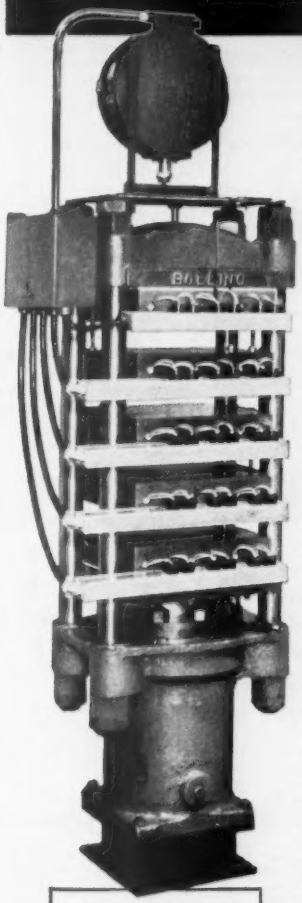

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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, FEB. 2, 1953

Natural Rubber

The price of spot rubber on the New York Commodity Exchange has swung in a range of 2c since our last report (January 7), high for the period being 30c reached on January 8 and again on January 9, and low being 28c reached today (February 2). The average price of spot rubber for the month of January was 29.40c based on 21 trading days. This compares with an average of 31.26c in December, 1952.

Reports from abroad state that Indonesia is concluding or has already concluded an agreement with Red China to exchange rubber for rice. The initial trade has been reported to involve some 10,000 tons of rubber. In addition, there is again talk of a barter agreement between Indonesia and Argentina.

Natural rubber production in Malaya in December, 1952, amounted to 58,500 tons, almost 5,000 tons greater than in December of 1951, and the largest monthly total since March of 1951. Some tapering off in production will occur during the winter months. Malayan rubber stocks are estimated at 125,000 tons.

Today's quotations on the outside market, London and Singapore, follow:

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.28
February	.27⅞
March	.27¾
Thin Latex Crepe:	
Spot	.33½
Thin Brown Crepe, No. 2	.25¼
Smoked Blankets	.24¼
Flat Bark Crepe	.22¾

London Market

(Standard Smoked Sheets)

March	27.12 - 27.42
April-June	27.12 - 27.42

Singapore Market

(Standard Smoked Sheets)

March	26.47 - 26.54

Closing Rubber Prices on New York Commodity Exchange No. 1 R.S.S. Contract)

FROM JANUARY 8 TO FEBRUARY 2

Jan.	Spot	Mar.	May	July	Sept.	Sales
8	30.00	29.25	28.25	28.00	27.60	56
9	30.00	29.45	28.70	28.00	27.55	12
10						
11						
12	29.75	28.55	28.08	27.45	26.86	136
13	29.62	28.80	28.35	27.60	27.15	33
14	29.00	28.35	27.80	27.45	26.90	70
15	29.00	28.25	27.90	27.40	27.00	41
16	29.00	28.30	28.00	27.60	27.15	8
17						
18						
19	29.50	29.00	28.50	28.15	27.75	41
20	29.38	28.80	28.45	28.10	27.50	64
21	28.88	28.25	27.90	27.40	27.00	53
22	29.00	28.60	28.25	27.65	27.25	8
23	29.38	29.00	28.50	27.90	27.50	7
24						
25						
26	28.00	28.10	27.60	27.20	26.70	74
27	28.38	28.05	27.50	27.00	26.75	60
28	28.12	27.90	27.40	26.90	26.40	28
29	28.12	27.70	27.25	26.75	26.30	54
30	28.25	28.00	27.40	27.00	26.55	33
31						
Feb.						
1						
2	28.00	27.65	27.16	26.75	26.35	40

Scrap Rubber

Scrap tires remain plentiful at relatively low prices, according to trade sources. Small price advances have been scored by tubes, specialties and light-colored stocks although all prices are still substantially below official ceilings. The almost certain removal of ceilings on scrap would have little effect on the market considering the current price structure. Prices established by the Office of Price Stabilization are shown below:

(Prices Delivered Akron)

Mixed tires	ton	$26.00
Mixed beadless tires	ton	34.00
Light colored carcass	ton	130.00
Black carcass	ton	50.00
No. 1 peelings	ton	65.00
No. 2 peelings	ton	42.00
No. 3 peelings	ton	38.00
Buffings	ton	30.00
Truck and Bus S.A.G.	ton	28.00
Passenger S.A.G.	ton	28.00
Mixed S.A.G.	ton	26.00
Light colored tubes	lb.	.16
Natural rubber red tubes	lb.	.16
Natural rubber black tubes	lb.	.11½
Mixed natural rubber tubes	lb.	.10
Butyl rubber tubes	lb.	.057
GR-S rubber tubes	lb.	.02
Mixed synthetic tubes	lb.	.03

Reclaimed Rubber

A feeling of optimism persists in the trade although business has not been quite up to expectations. Shipments in January were slightly less than anticipated. Present shortages of GR-S has led some consumers to turn to reclaim. In addition, the trade opines that consumers are showing a greater degree of price consciousness than heretofore, and this bodes well for the reclaim market. OPS-established prices for reclaimed rubber follow:

(Prices for All Areas Except Calif.)

Premium Grade Whole Tire	.10½
First Line Whole Tire	.10
Second Line Whole Tire	.09½
Third Line Whole Tire	.09¼
Fourth Line Whole Tire	.08¾
Black Carcass	.14½
No. 1 Light Colored Carcass	.20¾
No. 1 Select Peel	.11¾
No. 1 Peel	.10½
Butyl Tube Reclaim	.14½
S.P. Natural Rubber Black Tube	.21
Natural Rubber Black Tube	.20
Natural Rubber Red Tube	.24¼
Natural Rubber Gray Tube	.24¼

Cotton Tire Fabrics

Cotton tire fabrics continue to take an increasingly smaller part of the entire fabric market. It has been estimated by some that cotton now constitutes less than 9% of the over-all total in tire yarn. The trend away from cotton has been so pronounced that many manufacturers are reported to have dropped or to be in the process of dropping their cotton tire fabric lines. Prices quoted below are nominal:

Standard, Peeler, 12/4/2	lb.	.83
Extra Staple, Peeler, 12/4/2	lb.	.89

Chafers

14.4 oz. (per square yard)	lb.	.74
9.25 oz. (per sq. yard)	lb.	.69½
11.65 oz. (per sq. yard)	lb.	.66
8.9 oz. (per sq. yard)	lb.	.71

Cotton

Since our last report (January 7), the price of middling uplands on the New York Cotton Exchange has moved in the rather narrow range of 1.70c. High for the period was 34.10c reached on January 30, and low was 32.40c reached on January 12. The average price of middling uplands for the month of January was 33.24c based on 21 trading days. This compares with an average of 33.76c in the previous month.

Extra long staple cotton in the 1953 crop will be supported at a level 2.4 times that for upland cotton, the Department of Agriculture recently announced. This is required by a law passed in the 82nd Congress providing that the relationship between extra long staple and upland cotton be maintained under price supports. Upland cotton will be supported at 90% of parity during the 1953 season at a price not yet determined, and extra long staple cotton will be pegged at 2.4 times that rate.

Washington sources have estimated world cotton production in 1952-53 at 35,100,000 bales of 500 pounds gross, 500,000 bales less than in the 1951-52 season. This latest estimate of world cotton production is 80,000 bales above the earlier estimate of October, 1952.

The International Cotton Advisory Council has estimated thtt well over half the exportable world surplus of raw cotton is covered by price support legislation. The remainder, quite a sizable amount, is completely free from such controls. Under these conditions, the U.S. market price is likely to continue to influence the general level of world cotton prices with some modifications resulting from surpluses elsewhere.

Quotations for middling uplands on the Exchange follow:

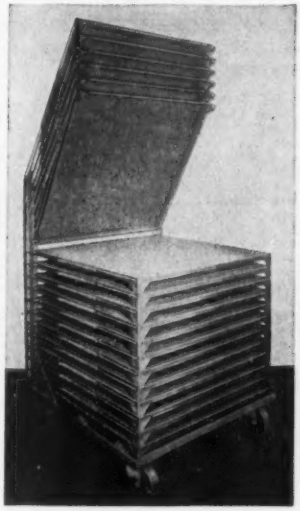
	Jan. 7	February 2		
	Close	High	Low	Close
Mar.	33.35	33.59	33.20	33.26
May	33.89	33.88	33.50	33.51
July	34.29	34.15	33.75	33.76

Synthetic Rubber

(Dry Types—Per Pound)

	*
Butaprene NF	.490 - .500
Butaprene NL	.500 - .510
Butaprene NAA	.540 - .550
Butaprene NXM	.580 - .590
Chemigum 30N4NS	.500 - .510
Chemigum 50N4NS	.500 - .510
Chemigum N3	.580 - .590
G-E Silicone Rubber (compounded)	3.15 -4.00
G-E Silicone Gum (not compounded)	—— -4.48
GR-I	—— - .2075
GR-S	—— - .230
Hycar OR-15	.580 - .590
Hycar OR-25	.500 - .510
Hycar OS-10	.550 - .560
Neoprene Types CG and AC	—— - .500
Neoprene Type E	—— - .650
Neoprene Types FR and KNR	—— - .800
Neoprene Type GN	—— - .380
Neoprene Type GN-A	—— - .380
Neoprene Type RT	—— - .400
Neoprene Type S	—— - .380
Neoprene Type W	—— - .400
Paracril B	.500 - .510
Paracril BJ	.500 - .510
Paracril C	.580 - .590
Silastic (compounded)	2.35 -4.40
Thiokol Type A	—— - .470
Thiokol Type FA	—— - .640
Thiokol PR-1	—— - .950
Thiokol Type ST	—— -1.000

SPRING LEAF TRUCK



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CURRENT MARKET PRICES

Of Rubber Chemicals and Compounding Ingredients

FEBRUARY 2, 1953

Prices are, in general, f.o.b. works. Range of prices indicates grade or quantity variations.

Abbreviations: bbls., barrels; c.l., carlot; cyl., cylinder; dlvd., delivered; dms., drums; l.c.l., less than carlot; M.B., masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

***For Export Only**

The arrangement of this section closely follows the Chemical Section of the 1951-52 RUBBER RED BOOK. Readers are referred to the RUBBER RED BOOK for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)	lb.	.48	.55
A-32	lb.	.61	.68
A-77	lb.	.47	.60
A-100	lb.	.47	.60
Accelerator No. 8	lb.	——	1.01½
Accelerator—49	lb.	.49½	.50½
Accelerator—552	lb.	——	2.07
Accelerator—808	lb.	.61	.63
Accelerator—833	lb.	1.17	1.19
Altax	lb.	.43½	.45½
Ancap *	lb.	.35	.37
Ancatax *	lb.	.43½	.45½
Ancazate * BU (ET & ME)	lb.	——	1.03½
Ancazide * ET	lb.	——	1.03½
ME	lb.	——	1.13½
Arazate	lb.	——	2.23½
Beutene	lb.	.61	.63
Bismate, Rodform	lb.	——	3.00
Butasan	lb.	——	1.03½
Butazate	lb.	——	1.03½
Butyl Eight	lb.	1.00	1.35
Captax	lb.	.35	.37
C-P-B	lb.	——	1.95
Cumate, Rodform	lb.	——	1.45
Dibenzo G-M-F	lb.	——	2.58½
Diorthotolylguanidine	lb.	.54	.55
Diphenylguanidine	lb.	.44½	.50½
El-Sixty	lb.	.46½	.53½
Ethasan	lb.	——	1.03½
Ethazate	lb.	——	1.03½
Ethex	lb.	——	1.00
Ethyl Thiurad	lb.	——	1.03½
Ethyl Tuex	lb.	——	1.03½
Ethylac	lb.	.91	.93
G-M-F	lb.	——	2.58
Good-rite Erie	lb.	.35	.37
Guantal	lb.	.55	.62
Harvex	lb.	.52	.57
Hepteen	lb.	.43½	.45½
Base	lb.	1.80	1.85
Ledate, Rodform	lb.	——	1.00
Merac	gal.	.75	.80
Mercaptobenzothiazole	lb.	.35	.37
Mercaptobenzothiazyl Disulfide	lb.	.43½	.45½
Mertax	lb.	.45½	.52½
Methasan	lb.	——	1.03½
Methazate	lb.	——	1.03½
Monex	lb.	——	1.13½
Mono Thiurad	lb.	——	1.13½
Morfex	lb.	.61	.63
2-MT	lb.	——	.77½
NA-22 (for neoprene)	lb.	——	1.50
O-X-A-F	lb.	.44½	.46½
Pentex	lb.	——	1.03½
Flour	lb.	——	.20½
Permalux (for neoprene)	lb.	——	2.17
Phenex	lb.	.49	.54
Pip-Pip	lb.	——	2.07
R-2 Crystals	lb.	——	2.20
Rotax	lb.	.45½	.47½
RZ-50	lb.	——	1.00
SA 52	lb.	——	1.13½
SA 57	lb.	——	1.03½
SA 62	lb.	——	1.03½
SA 66	lb.	——	1.50
SA 67	lb.	——	1.03½
SA 77	lb.	——	1.03½
Safex	lb.	——	1.15
Santocure	lb.	.68	.75
Selazate	lb.	——	1.45
Selenac (Ethyl, Methyl)	lb.	——	1.50
Setsit-5	lb.	.75	1.05
SPDX-GH (tons)	lb.	.64	.69
GL	lb.	——	.93
Tellurac	lb.	——	1.45
Tepidone	lb.	.45	.48
Tetrone A	lb.	——	1.91
Thiofide	lb.	.43½	.50½
S	lb.	.46½	.51½
Thionex	lb.	——	1.13½
Thiotax	lb.	.35	.42
Thiurad	lb.	——	1.13½
Thiuram E	lb.	——	1.03½
M	lb.	——	1.13½
Trimene	lb.	.56	.58
Base	lb.	1.03	1.06
Tuads, Ethyl	lb.	——	1.03½
Tuads, Methyl	lb.	——	1.13½
Tuex	lb.	——	1.13½
Ultex	lb.	1.00	1.05
Unads	lb.	——	1.10
Ureka Base	lb.	.66	.73
Vitasan Crystals	lb.	.48	.53
Vulcacure NB	lb.	——	.45
ZB	lb.	——	.85
ZE	lb.	——	.85
ZM	lb.	——	.85
Z-B-X	lb.	——	2.45
Zenite	lb.	.43½	.45½
A	lb.	.51½	.53½
Zenite Special	lb.	.44½	.46½
Zetax (uncoated)	lb.	.44½	.46½
Zimate, Butyl	lb.	——	1.03½
Zimate, Ethyl	lb.	——	1.03½
Zimate, Methyl	lb.	——	1.03½

ACTIVATORS

Blue Lead Sublimed (dlvd.)	lb.	.13¼	.14¼
Fish Oil, Hydrogenated, Fatty Acid			
Hydrofol Acid (dlvd.)	lb.	.10½	.14¾
Hyfac 430 (dlvd.)	lb.	.14	.15¼
Neo-Fat H.F.O. (dlvd.)	lb.	.14½	.15¾
Stearex Beads (dlvd.)	lb.	.12	.13¼
Lime, Hydrated			
Arrowhead	ton	——	20.65
Marblehead	ton	——	15.00
Sierra	ton	——	19.50
Litharge			
Eagle (dlvd.)	lb.	——	.1625
SB (dlvd.)	lb.	——	.1625
Magnesium Oxide, Heavy			
General Magnesite 500	lb.	.05	.06½
600	lb.	.06	.08
Michigan No. 15	lb.	.0550	.0600
Permanente	lb.	.05	.06½
Magnesium Oxide, Light			
Baker's (Neoprene Grade)	lb.	——	.31
General Magnesite (Neoprene Grade)	lb.	——	.30
General Magnesite No. 101	lb.	——	.19
General Magnesite Standard	lb.	——	.22
K & M (Neoprene Grade)	lb.	.30	.31
Maglite D	lb.	——	.25
M	lb.	——	.31
Marine's (Neoprene Grade) (l.c.l.)	lb.	——	.31
Michigan No. 30	lb.	——	.24
No. 40 Extra Light	lb.	——	.31
Witco Extra Light	lb.	.32	.35
Oleic Acid			
Emersol 210 (dlvd.)	lb.	.11¾	.14¾
L.C.P. Red Oil	lb.	.11¼	.14¼

ACTIVATORS (Cont'd)

Palm Oil Fatty Acid (c.l.)	lb.	.11½	.14½
Potassium Oleate (drums)	lb.	.45	.55
Red Lead			
Eagle	lb.	——	.1725
No. 2 RM (dlvd.)	lb.	——	.1725
Sodium Laurate, 75%	lb.	.64	.74
Sodium Oleate, 75%	lb.	.45	.55
Paste (drums)	lb.	——	.20
Sodium Stearate, 75%	lb.	.45	.55
USP Grade (drums)	lb.	——	.37
Stearic Acid, Single Pressed			
Emersol 110 (dlvd.)	lb.	.11	.12¼
Groco 53	lb.	.11	.12¼
Stearex B (dlvd.)	lb.	.15½	.16¼
Stearic Acid, Double Pressed			
Groco 54	lb.	.11½	.12¼
Stearic Acid, Other			
Neo-Fat 1-58	lb.	.1190	.1315
1-60	lb.	.1400	.1525
1-65	lb.	.1450	.1575
White Lead Basic Carbonate	lb.	.1700	.1800
White Lead Basic Sulfate	lb.	.1919	.2019
Zinc Laurate			
Laurex	lb.	.29	.33
Zinc Stearate	lb.	.37	.39
Aquazinc	lb.	.28	.35

Unclassified Activators

Actifat (dms.)	lb.	——	.18
Aktone	lb.	.22	.23
Barak	lb.	——	.62
Curade	lb.	.57	.59
D-B-A	lb.	——	1.95
Dibutylamine (dlvd.)	lb.	.53	.55¾
MODX	lb.	.295	.345
Polyac	lb.	——	1.65½
Ridacto (drums)	lb.	.25	.26
Snodette (dlvd.)	lb.	.16	.17¼
SOAC (min. 10 dms.)	cwt.	——	8.00
Vulklor	lb.	.75	.85

ANTI-COAGULANTS

Anhydrous Ammonia (l.c.l.)	lb.	.17	.21
Aqua Ammonia (dms.)	lb.	.031	.035
M.B.M. (l.c.l.)	lb.	——	.35

ANTI-FOAMING AGENTS

Aero Anti Foam H	lb.	——	.20
Regular	lb.	——	.12
D.C. Antifoam A	lb.	5.65	6.65
Antifoam A Emulsion	lb.	2.30	4.00
Defoamer A-25	lb.	——	3.00
Deltyl Prime	lb.	.70	.82
Defoamer 630	lb.	——	.12½
Kessco X-3 (dms.)	lb.	——	.47¾
Modicol A	lb.	.12	.15
B	lb.	.35	.40
RS-968	lb.	.38	.38½
Terpinol Prime No. 1	lb.	.39	.54

ANTI-OXIDANTS

Agebest 1293-22A	lb.	1.90	2.00
Agerite Alba	lb.	2.27½	2.37½
Gel	lb.	.62	.64
Hipar	lb.	.94	.96
H. P.	lb.	.69½	.71½
Powder	lb.	.50½	.52½
Resin	lb.	.67	.69
Resin D	lb.	.50½	.52½
Stalite	lb.	.50½	.52½
White	lb.	1.45	1.55
Akroflex C	lb.	.69½	.71½
F	lb.	.69½	.71½
Aminox	lb.	.50½	.52½
Antioxidant 2246	lb.	1.65	1.68
Antox	lb.	.50½	.52½
Aranox	lb.	——	3.25
Benzoquinone	lb.	1.50	1.75
Betanox Special	lb.	.72½	.74½
B-L-E	lb.	.50½	.52½
Carvacrol	lb.	——	.78
Deenax	lb.	.95	1.05
Di-tert-Butyl-para-Cresol	lb.	.91	.95
Eugenol C-95%	lb.	3.34	3.54
Flectol H	lb.	.50½	.57½
Flexamine	lb.	.69½	.71½
Neozone A	lb.	.52½	.54½
C	lb.	——	.69½
D	lb.	.50½	.52½

CRUDE AND
SYNTHETIC

Rubber

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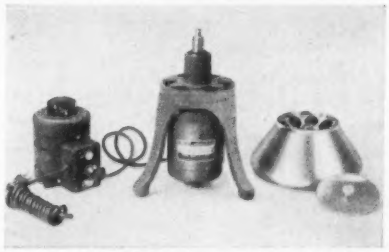

Max. speed: 14,000 rpm or RCF 25,000 x G
Max. Capacity 8 x 50cc

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(Superspeed)

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210 FIFTH AVENUE, NEW YORK 10, N. Y.

IF YOU CUT RUBBER

in Your Processing You Should Have This Free— BOOKLET

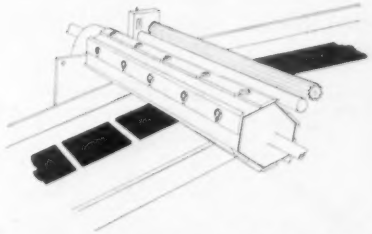
This four-page, two-color illustrated folder shows modern Taylor-Stiles Cutters of several types used by leading rubber manufacturers for various purposes —

— Taylor-Stiles Number 218 Dicing Cutters, to cut sheet rubber stock into strips and then cross cut these strips into small uniform particles prior to extruding and molding.

— Taylor-Stiles Number 100 and 200 Cutters to cut continuously extruded stock into blanks of uniform dimensions for molding.

— Taylor-Stiles Number 300, 400, and 500 for very heavy duty, such as cutting rubber scrap and automobile tires.

Folder APP-202 describes these and other Taylor-Stiles Rubber Cutters. Send for a copy today.



Cutting continuously extruded stock into blanks prior to molding.

TAYLOR-STILES and Company
CUTTING MACHINES & KNIVES

16 Bridge Street, Riegelsville, New Jersey

ANTI-OXIDANTS (Cont'd)

Oxidex	lb.	—	3.60
PDA-10 and 20	lb.	.39	.41
Permalux	lb.	—	2.10
Resorcin, Tech. (dlvd.)	lb.	.82½	.83½
Santoflex AW	lb.	.75	.82
B	lb.	.50½	.57½
BX	lb.	.62	.69
35	lb.	.69½	.76½
Santovar-A	lb.	1.50	1.57
O	lb.	1.30	1.37
Santowhite Crystals	lb.	1.60	1.67
Santowhite L	lb.	.50½	.57½
MK	lb.	1.29	1.36
S.C.R. (tons)	lb.	.32	.34
Sequestrene AA	lb.	—	1.00
NA2	lb.	—	.82
NA3	lb.	—	.80
Stabilite	lb.	.53	.55
Alba	lb.	.72	.77
L	lb.	.53	.55
White	lb.	.49	.51
Stabilizer No. 1	lb.	—	1.55
Stabilizer No. 9-A	lb.	.80	1.05
Styphen I	lb.	.49½	.54½
Sunolite	lb.	.20	.23
Tannic Acid, Tech.	lb.	.46	.48
Thermoflex A	lb.	.98	1.00
V-G-B	lb.	.67	.69
Wing-Stay S	lb.	.50	.51

ANTI-SCORCHING AGENTS

Armeen HT	lb.	.34	.42
Benzoic Acid—Tech.	lb.	—	.43
Good-rite Vultrol	lb.	.60	.62
Sodium Acetate 60-62% Crystals	lb.	—	.06

ANTISEPTICS AND GERMICIDES

Arquad S	lb.	.22	.25
Formaldehyde (dms.)	lb.	.066	.071
G-4 (bbls.)	lb.	1.04	1.19
G-11	lb.	2.60	2.75
Nuodex 100 S.S. (dlvd.)	lb.	—	1.10
Nuodex 100 W.D. (dlvd.)	lb.	—	1.25
Nuodex Zinc 8% (dms.) (dlvd.)	lb.	.24	.28
Ortho Cresol (26°-27°)	lb.	—	.201
Retarder D	lb.	.42	.50
Soligen Drier—Copper 8% (dms.)	lb.	.23½	.24¼
Copper 6% (dms.)	lb.	.18¼	.19½
Zinc 8% (dms.)	lb.	.22¼	.23½
Zinc 8% (dms.)	lb.	—	.21¼
Vancide	lb.	—	.80

ANTI-WEEBING AGENTS (for Latex)

Webnix 34	lb.	1.50	2.25

AROMATICS (DEODORANTS)

Airkem 115	gal.	—	6.50
122	gal.	—	6.50
Alamasks	lb.	.50	6.50
Bouquet 149	lb.	—	3.00
Coumarin	lb.	—	2.75
Curodex 19	lb.	—	4.75
188	lb.	—	5.75
198	lb.	—	6.75
Deodorant 65	lb.	—	1.85
Deodorant L-37	lb.	2.00	2.40
L-44	lb.	2.50	2.90
N.L.T.X.	lb.	1.85	2.15
Deodorant Oil GD 3427	lb.	1.70	2.00
GD 6422	lb.	2.00	2.50
GD 6423	lb.	1.60	1.90
GD 6575	lb.	2.45	2.95
GD 31063	lb.	2.65	3.15
Latex Perfume 5	lb.	—	3.25
6	lb.	—	7.50
9	lb.	—	.65
Neugaromes (dms.)	lb.	1.30	3.00
Neutroleum Delta	lb.	—	2.60
Gamma	lb.	—	3.60
Parador A	lb.	1.95	2.25
C	lb.	2.75	3.25
E	lb.	.25	.55
GD 5280	lb.	2.00	2.50
GD 5348	lb.	1.90	3.25
Perfume Oil Bouquet Vanilla M	lb.	2.40	2.75
Rodo No. 0	lb.	4.00	4.50
No. 10	lb.	5.00	5.50
Rubbarome (dms.)	lb.	1.00	3.80
Rubber Perfume 12	lb.	—	2.85
Russian Leather 7	lb.	—	4.35
Vanillin	lb.	3.00	4.05

BLOWING AGENTS

Ammonium Bicarbonate (dlvd.)	lb.	.0725	.1075
Blowing Agent CP-975	lb.	—	.35
Sodium Bicarbonate, U.S.P. (c.l. bags)	cwt.	—	2.10
Sponge Paste	lb.	—	.20
Unicel	lb.	—	.82
ND	lb.	—	1.11
S	lb.	—	.20
Urea	lb.	.0425	.0475

BONDING AGENTS

Brare	gal.	6.00	7.50
Durez 12987	lb.	.48	.53
Kalabond	gal.	6.50	7.75
MDI	lb.	4.00	5.00
50	lb.	2.00	2.50
Penacolite B1A	lb.	—	.88
Pliobond 20	gal.	2.91	4.23
30	gal.	3.65	4.97
Reanite	gal.	6.75	7.25
Rex Compounds	gal.	1.30	2.85
Ty-Ply Q (BN & S)	gal.	6.75	8.00

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	9.00	11.00
Glacial—99½% (bbls.)	cwt.	14.05	14.55
Calcium Nitrate, Tech., Crystals	lb.	.07	.17
Hydroxyacetic Acid—70% (dms.)	lb.	—	.084
Zinc Nitrate, Tech.	lb.	—	.22½

COLORING AGENTS

Black

Aquablak II (also M, R)	lb.	.08	.11¼
Aquablak S	lb.	.11	.11½
Black Shield 4-35 (dms.)	lb.	—	.0825
Carbon Black—See *Reinforcing Agents*			
Lampblack No. 10	lb.	.06	.09
Mapico Black Iron Oxide (50 lb. bags)	lb.	.11¾	.12
Pure Black Iron Oxide	cwt.	11.75	12.00

Blue

Blue GD, Dispersed	lb.	—	4.55
Blue GD Paste	lb.	—	1.80
Milori Blue	lb.	.45	.48
Monastral Fast Blue CPL	lb.	—	1.77
PCD, Dispersed	lb.	—	2.50
Ramapo Blue	lb.	3.40	3.45
Rubber Blue X-1999	lb.	—	1.70
Stan-Tone Blue	lb.	1.40	4.00
Ultramarine	lb.	.14	.30
Vansul Blue M.B.	lb.	.90	2.65
Victoria Blue BP-262-D	lb.	2.25	2.30

Brown

Brown Iron Oxide	lb.	.11¾	.12
Mapico Brown (50 lb. bags)	lb.	.12¾	.13

Green

Filo Green	lb.	—	.32
Green Chromium Oxide, Pure	lb.	.37½	.44½
Green Chromium Oxide, Pure, Hydrated	lb.	.95	1.05
Green FD, Dispersed	lb.	—	1.85
Monastral Fast Green GSD, Dispersed	lb.	—	3.20
GSL	lb.	—	1.97
Permanga Green CP-594	lb.	—	1.35
Pigment Green B	lb.	—	1.35
GL-652D	lb.	.88	.93
Ramapo Green	lb.	—	4.00
Rubber Green X-1292	lb.	—	1.15
Stan-Tone Green	lb.	1.50	3.30
Vansul Green M.B.	lb.	1.05	3.05

Maroon

Stan-Tone Maroon	lb.	3.00	3.05
Vansul Maroon M.B.	lb.	1.05	2.80

Orange

Molybdate Orange	lb.	—	.44
Orange FD, Dispersed	lb.	—	2.75
Rubber Orange X-2065	lb.	—	3.00
Stan-Tone Orange	lb.	1.65	4.00
Vansul Orange M.B.	lb.	2.25	2.60

Red

Antimony Trisulfide	lb.	.72	.78
R. M. P. Sulfur Free	lb.	—	.78
R. M. P. No. 3	lb.	—	.72
Cadmium Red	lb.	.95	1.25
Cadmolith Red (bbls.)	lb.	1.75	2.00
Graphic Red (dlvd.)	lb.	—	.85
Indian Red, American, Pure	lb.	.12¼	.12½
Doxco (English)	lb.	.11½	.11¾
Mapico Reds (50 lb. bags)	lb.	.1225	.1250
Oximony Iron Oxide	lb.	—	.09
Red Iron Oxide, Light	lb.	.12¼	.12½
Red PBD, Dispersed	lb.	—	1.75
2BD, Dispersed	lb.	—	1.80
2BL	lb.	—	1.32
PBL	lb.	—	1.65
Rubanox Red CP-762 (dlvd.)	lb.	—	1.40
Rubber Red CP-339 (dlvd.)	lb.	—	1.10
Rubber Red X-1148	lb.	—	.85
Rubbered	lb.	.1150	.1175
Solfast Red	lb.	1.40	1.95
Stan-Tone Red	lb.	1.10	3.05
Sun Burnt Red	lb.	.1150	.1175
Vansul Red M.B.	lb.	.95	3.40
Watchung Red	lb.	—	1.95

White—Lithopone

Albalith	lb.	.0750	.0850
Cryptone BT	lb.	.10	.11
Eagle	lb.	.06¼	.06½
Permolith	lb.	.0790	.0890
Ponolith	lb.	.0790	.0865
Sunolith	lb.	.0790	.0865

COLORING AGENTS (Cont'd)

White—Titanium Pigments

Ti-Cal	lb.	.08	.08¼
Ti-Pure	lb.	.21	.24
Titanox A—all grades (dlvd.)	lb.	.21	.22
RA (dlvd.)	lb.	.23	.24
RA-10 (dlvd.)	lb.	.23	.24
RA-NC (dlvd.)	lb.	.23	.24
RC (dlvd.)	lb.	.08¼	.08¼
RC-HT (dlvd.)	lb.	.08	.08½
Unitane O-220	lb.	.195	.205
OR-250	lb.	.215	.225
Zopaque	lb.	.21	.22

White—Zinc Oxide (American Process)

AZO-ZZZ 11 (and 22, 23, 44, 55)	lb.	.1425	.1525
Eagle	lb.	.1425	.1525
Horse Head Special	lb.	.1425	.1525
XX Red	lb.	.1425	.1525
XX-505	yb.	.1575	.1675
Protox 166	lb.	.1425	.1525
167	lb.	.1425	.1525
St. Joe Black Label	lb.	.1425	.1525
Green Label	lb.	.1425	.1525
Red Label	lb.	.1425	.1525

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	—	14

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1650	.1750
Eagle Green Seal	lb.	.1600	.1700
Eagle Red Seal	lb.	.1550	.1660
Eagle White Seal	lb.	.1650	.1750
Florence Green Seal	lb.	.1600	.1700
Red Seal	lb.	.1550	.1650
White Seal	lb.	.1650	.1750
Kadox 25	lb.	.1650	.1750
Kadox 15, 17 and 72	lb.	.1425	.1525
U. S. P. 12	lb.	.1750	.1850

White—Zinc Sulfide

Cryptone ZS-800	lb.	.2530	.2630

Yellow

Benzidine Yellow	lb.	1.91	2.15
Cadmolith Yellow (bbls.)	lb.	—	1.27
Chrome Yellow	lb.	—	.31
Iron Oxide, Pure	lb.	.10	.10¼
Mapico Yellow (50 lb. bags)	lb.	.1000	.1025
Rubber Yellow X-1940	lb.	—	2.15
Stan-Tone Yellow	lb.	1.00	2.25
Toluidine Yellow	lb.	—	1.91
YL-556-D	lb.	—	.82
Oximony Iron Oxide	lb.	—	.06¼
Vansul Yellow M.B.	lb.	1.05	1.85
Yellow GD, Dispersed	lb.	—	2.15
GL	lb.	—	1.62
Zinc Yellow	lb.	—	.25

DISPERSING AGENTS

Anchoid*	lb.	.24	.25
Armeen 18	lb.	.42	.50
Blancol Conc. Powder	lb.	.15½	.17½
Darvan No. 1 (and No. 2)	lb.	.22	.30
Daxad 11 (21, 23)	lb.	.08	.35
Dispersaid	lb.	1.25	1.35
Furala	lb.	.06½	.07½
Halloid	lb.	.04½	.05½
Lomar PW	lb.	—	.16
Marasperse C	lb.	.06½	.06¼
CB	lb.	.12¼	.13¼
N	lb.	.09½	.10½
Modicol C	lb.	.08	.12
Rubbex	lb.	.267	.285
Stan-Chem BQC	lb.	.12¼	.17¼
1067	lb.	—	.13½
1471	lb.	.1687	.2187
2251	lb.	.12¼	.17¼
Trenamine D-25	lb.	.32½	.36
Triethanolamine (drums) (dlvd.)	lb.	.24½	.27½
Yelkin TT	lb.	.14	.18
Zinsper	lb.	—	.15
Emcol K-8300 (dms.)	lb.	.19	.20

EXTENDERS

Advagum 1098	lb.	—	.64
Arceo 1071-13B	lb.	.14½	.15½
1073-18B	lb.	.13½	.14½
1294-36B	lb.	.11½	.12½
Bunaweld Polymer No. 780	lb.	—	.22
No. 5514	lb.	—	.35
D-92 (and D-93) (dms.)	lb.	—	.12
Car-Bel-Ex-A	lb.	—	.14
Extender 600	lb.	—	.1480
Polyco 418	lb.	.17	.18
PR-162 Latex Extender	gal.	—	1.55
Synprolac	lb.	.16	.23
Synprowax	lb.	—	.23
Vistanex	lb.	—	.32

UTILITY FAN OR V-BELT COVERING MACHINE FOR VARIOUS SIZES AND CROSS-SECTION BELT

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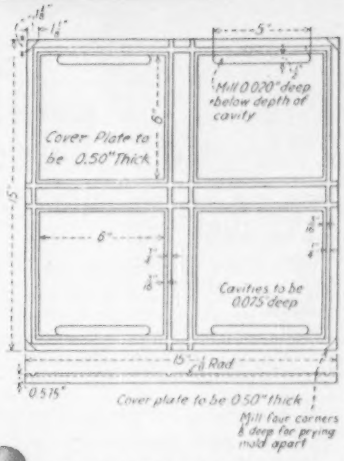
Single and multi-cavity molds made to order for making samples for testing adhesion, abrasion, flexing, compression, rebound. Years of experience in rubber. Prompt service.


Mill 0.020" deep below depth of cavity
Cover Plate to be 0.50" Thick
Cavities to be 0.075 deep
Cover plate to be 0.50" thick
Mill four corners ½ deep for prying mold apart

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1" and 2" Centers

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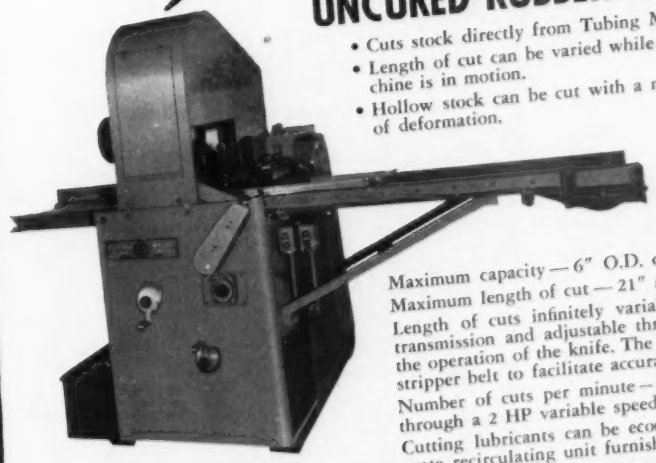
for **CUTTING CURED *and* UNCURED RUBBER STOCKS**

- Cuts stock directly from Tubing Machine.
- Length of cut can be varied while the machine is in motion.
- Hollow stock can be cut with a minimum of deformation.

Here is the IMPROVED "SC6" STOCK CUTTER

- GREATLY IMPROVED CUTTING ACCURACY
- LESS MAINTENANCE
- LESS WEAR ON MACHINE



Maximum capacity — 6" O.D. or 12" wide thin flat stock.
Maximum length of cut — 21" at lower speeds.
Length of cuts infinitely variable through a positive variable transmission and adjustable throw eccentric, synchronized with the operation of the knife. The machine is equipped with driven stripper belt to facilitate accurate feeding of the stock.
Number of cuts per minute — infinitely variable from 15 to 120 through a 2 HP variable speed main drive.
Cutting lubricants can be economically applied through a separate recirculating unit furnished in addition if desired.

Anti-friction bearings throughout, and drives units are completely enclosed and run in oil for efficient lubrication.

Completely equipped with 4 ft. long input and 3 ft. long take-off conveyors.

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175 Osborne Street — **Bridgeport 5, Conn.**

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NEW YORK & EXPORT OFFICE 261 Broadway

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite	lb.	.19½	1.30
Lionite	lb.	.14	1.20
Pumice	lb.	.03	.05
Aluminum Hydrate	lb.	.07	.10
Aluminum Silicate			
Marter White	ton	18.50	30.00
Barium Carbonate (l.c.l.)	ton	72.50	90.00
Barytes			
No. 1 Floated, White	ton	37.85	53.60
No. 2 Floated, Unbleached	ton	35.85	51.60
No. 22 Barytes (c.l.)	ton	——	20.00
Foam A	ton	——	37.60
Bentonite (c.l.)	ton	——	12.50
Argosite Clay (c.l.)	ton	——	12.50
Bennett Clay (c.l.)	ton	——	32.50
SPV Volclay (c.l.)	ton	——	12.50
Blanc Fixe	ton	72.50	120.00
Calcium Carbonate			
Atomite (c.l.)	ton	——	30.00
B.I. White No. 1 (c.l.)	ton	——	7.50
B.I. White No. 2 (c.l.)	ton	——	7.00
Blue Star XX	ton	——	15.50
Calcene NC	ton	——	72.50
TM	ton	75.00	95.00
Caltec	ton	40.00	57.50
Calwhite	ton	——	17.00
Camelwite	ton	——	30.00
Gamaco	ton	——	30.00
Kalite (c.l.)	ton	——	50.00
Laminar	ton	——	30.00
Lesamite (c.l.)	ton	——	27.50
Millical (c.l.)	ton	——	32.50
Multifex	ton	——	120.00
M	ton	——	110.00
Non-Fer-Al	ton	——	25.00
Purecal D	ton	51.75	66.75
M	ton	46.50	66.75
T	ton	110.00	125.00
U	ton	120.00	135.00
Sierracal	ton	15.00	18.50
Super Multifex	ton	——	160.00
Surfex (c.l.)	ton	——	35.00
Suspenso (c.l.)	ton	——	30.00
Witcarb B	ton	51.75	66.75
P	ton	110.00	125.00
R	ton	120.00	135.00
R-12	ton	46.50	66.75
York White	ton	——	9.50
Calcium Silicate			
Silene EF	ton	120.00	140.00
Calcium Sulfate, Anhydrous			
Snow White Filler	ton	——	20.50
Calcium Sulfate, Hydrous			
Terra Alba No. 1	ton	12.00	14.40
Chalk Whiting (l.c.l.)	lb.	.0150	.0175
Recco Paris Whiting	ton	——	33.00
Clay			
Aiken Clay	ton	——	14.00
Alsilite (c.l.)	ton	20.00	45.00
Alsite (c.l.)	ton	——	14.00
Aluminum Flake	ton	17.00	60.00
Buca (c.l.)	ton	——	45.00
Burgess No. 20	ton	——	35.00
No. 30	ton	——	37.00
Burgess Iceberg	ton	——	50.00
Burgess Polyclay	ton	——	45.00
Catalpo (c.l.)	ton	——	35.00
Champion	ton	——	14.00
C.S.D. (c.l.)	ton	——	13.50
Crown	ton	——	14.00
Dixie (c.l.)	ton	——	14.00
Hi-White R	ton	——	13.50
Hydratex R	ton	——	28.00
Kaolloid Clay (c.l.)	ton	——	10.50
Markham (c.l.)	ton	14.00	35.00
McNamee (c.l.)	ton	——	13.50
Oldham (c.l.)	ton	13.50	35.00
Paragon	ton	——	13.50
Pigment 5	ton	21.85	36.00
Pigment 22	ton	17.00	22.50
Pigment 33	ton	——	37.00
Recco (c.l.)	ton	——	14.00
RX-43	ton	——	33.00
Stan-Clay	ton	25.00	30.00
Stellar-R	ton	——	50.00
Suprex	ton	——	14.00
Whitetex (c.l.)	ton	——	50.00
Diatomaceous Earth	ton	30.00	50.00
Kaylorite (c.l.)	ton	——	30.00
Lorite	ton	——	30.00
Flock			
Cotton, white and colored	lb.	.13	.33
Filfloc F 40-9000	lb.	——	.16
Filfloc F 6000	lb.	——	.40
Polycel	ton	110.00	210.00
Rayon, bleached or dyed	lb.	.87	1.50
Rayon, grey	lb.	——	.18
Rayon, pink	lb.	——	.18
Solka-Floc (l.c.l.)	lb.	.07	.16
Glue Bone (dlvd.)	lb.	.18	.20½
Leather, Shredded	lb.	.05	.17
Lignin	lb.	.03	.06
Indulin	lb.	.09	.10
Limestone, Pulverized	ton	3.25	10.00
Georgia Marble No. 10	ton	——	10.00
Industrial Filler No. 100	ton	——	5.75
Micro Velva	ton	43.00	48.00
Velvet Filler, Superfine	ton	——	27.00
Magnesium Carbonate	lb.	.0950	.1050
K & M Clearcarb	lb.	.1225	.1275
Magnesium Oxide	lb.	.05	.06

FILLERS (Cont'd)

Magnesium Silicate	ton	18.00	35.00
Airex	ton	25.00	27.00
Asbestol	ton	——	25.00
Blue Star Talc	ton	——	23.00
L.S. Silver	ton	23.50	25.50
Sierra White	ton	21.25	23.25
Mica	lb.	.01¼	.07¼
Concord	lb.	.07	.07¼
Micro-Mica	lb.	.06¼	.07½
Mineralite (c.l.)	ton	25.00	85.00
Silversheen	lb.	.07¼	.08
Triple A Mica (c.l.)	ton	——	25.00
Vermiculite	lb.	——	.11
Wet Ground Biotite Mica	lb.	.05½	.06¼
Wet Ground Mica No. 160	lb.	.07	.07¼
Pyrophyllite			
Pyrax A (c.l.)	ton	——	13.50
WA (c.l.)	ton	——	16.00
Silica	ton	16.00	27.00
Blue Star	ton	——	20.60
Slate, Powdered (l.c.l.)	ton	15.00	20.00
Talc, Domestic	ton	10.00	27.00
Nytal 200	ton	——	25.00
300	ton	——	36.00
Walnut Shell Flour	ton	45.00	111.00
Whiting, Commercial	ton	——	7.00
Camel-Carb	ton	——	10.00
C-C-O White	ton	——	18.00
Georgia Marble No. 15	ton	——	15.00
No. 16	ton	——	16.00
Keystone (c.l.)	ton	——	16.00
Rambo No. 1 White	ton	——	8.50
No. 6 White	ton	——	9.00
Snowflake (c.l.)	ton	——	18.00
Veroc (c.l.)	ton	——	8.50
Welco (c.l.)	ton	——	8.50
York White R (c.l.)	ton	——	8.50
Wood Flour	ton	22.00	49.00

FINISHING MATERIALS, SURFACE

Beaco Finishes	gal.	2.10	2.35
Black Out	gal.	4.50	8.00
Shellac, Orange Gum	lb.	.40	.45
VanWax	gal.	1.45	1.50

FLAME RETARDANTS

Chlorowax 70	lb.	.18	.19
Halowax	lb.	.27	.42
Zinc Borate 3167	lb.	.1920	.2020
Zyrox	lb.	.49	.78

LUBRICANTS, MOLD

Aquadag	lb.	3.50	4.00
Aquarex D	lb.	——	.80
E	lb.	——	.94
MDL	lb.	——	.33
WAQ	lb.	——	.28
Akro Gel	lb.	——	.165
Borax, Granular (l.c.l.)	ton	81.00	86.00
Carbowax 4000	lb.	.33	.34
CD Mold Release A	gal.	——	7.00
Colite Concentrate (dms.)	gal.	——	.90
Concentrex	lb.	——	.25
D.C. 7 Compound	lb.	5.25	6.50
D.C. Emulsion No. 7	lb.	1.90	2.32
No. 35	lb.	1.59	3.50
No. 35A	lb.	1.59	3.50
No. 35B	lb.	1.59	3.50
D.C. Mold Release Fluid	lb.	3.70	6.00
Dipex	lb.	.14	.18
Dri-Lube	lb.	——	.22
Glydag	lb.	1.30	2.00
Hawkeye Flake (dlvd.)	lb.	——	.11
Kokobace	lb.	——	.12
Lubrex	lb.	.25	.30
Lubri-Flo	gal.	10.00	12.00
Migralube	lb.	——	.35
Mold Lubricant No. 72 Conc.	gal.	2.50	4.00
No. 735	gal.	1.26	2.75
No. 769	gal.	1.20	2.60
No. 880	gal.	——	1.12
Moldeze No. 3	gal.	5.00	6.00
Mold-Brite	gal.	——	1.50
Mold-Slick	lb.	.253	.271
Mold-White	gal.	——	2.00
Monopole Oil MD	lb.	——	.23
Nopcolube	lb.	——	.15
Orvus WA Paste (dms.)	lb.	——	.26
Prodag	lb.	.28	.42
Purity Flake (dlvd.)	lb.	——	.13
Rubber-Flo	gal.	1.25	1.60
Rubber-Glo	gal.	——	.94
Rusco Mold Paste	lb.	——	.25
Sericite (l.c.l.)	ton	65.00	75.00
Thermalube	lb.	——	.13¾
Ucon Lubricants	lb.	.28	.37
Ulco Mold Soap	lb.	.12	.23

LUBRICANTS, RUBBER

Diglycol Stearate Neutral (and SE) (dms.)	lb.	——	.25
Extrud-o-Lube	gal.	——	1.54
G.B. Naphthenic Neutrals	gal.	.11	.18
Latex-Lube GR (dlvd.)	lb.	.19¼	.20
Pigmented (dlvd.)	lb.	.18¾	.19¾
RS	lb.	——	.16½
Liqui-Lube (dlvd.)	lb.	——	.16¼
NF (dlvd.)	lb.	——	.16¾
NT (dlvd.)	lb.	——	.16¾
Propylene Stearate (dms.)	lb.	.68	.78

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.37	.39
Calcium Stearate	lb.	.35	.37
D.C. 4 Compound	lb.	5.13	6.50
D.C. 200 Fluid	lb.	3.70	6.00
Glycerized Lubricant	gal.	——	1.48
Hydro-Zinc	lb.	——	.20
Polyethylene Glycol	lb.	.26½	.29
Rexanol	lb.	——	.13
Separex	lb.	——	.25
Stock-Lube	lb.	——	.19
Slab-Dip	lb.	——	.15
Wet-Zinc	lb.	——	.22¼
Zinc Stearate	lb.	.37	.39
Z.S.D. Dispersion	lb.	——	.20

MOLD CLEANERS

Actusol (dlvd.)	gal.	1.45	1.65
Alkon (dlvd.)	lb.	.16	.16½
Metso 99	cwt.	4.00	5.85
Granular	cwt.	3.50	5.15
Rubber-Sol	gal.	2.97	3.97
Shelblast	ton	80.00	140.00
Sprex A.C. (dlvd.)	lb.	.17¼	.18¼

PEPTIZING AGENTS

Peptizer P-12	lb.	.84	1.00
Pepton 22	lb.	.74½	.77½
RPA 2	lb.	——	.77½
3	lb.	——	.47½
3-RO	lb.	——	.50½
5	lb.	——	.59

PLASTICIZERS & SOFTENERS

AA (dms.)	lb.	.26½	.28
Acto 500	lb.	——	.09
Adipol BCA (dms.)	lb.	.45½	.46
2EH	lb.	.47½	.48½
10A	lb.	.47½	.48½
ODY	lb.	.51¾	.52¾
American Pine Tar	lb.	.0410	.0678
Arneel	lb.	.22	.27
Arolene 1980 (c.l.)	lb.	——	.10
Aromatic Tar	gal.	.0573	.1973
Bardol	lb.	.02¾	.03¾
B	lb.	.06¼	.06½
Bayol D	gal.	——	.382
F	gal.	——	.52
Beeswax, Bleached	lb.	.85	.90
Yellow Refined	lb.	.70	.75
Bondogen	lb.	.55	.60
B.R.C. No. 20	lb.	.0150	.0175
B.R.H. 2	lb.	——	.0213
BRS 700	lb.	.02	.0285
B.R.T. 3	lb.	.0255	.0265
4	lb.	.0250	.0260
7	lb.	.03	.031
B.R.V.	lb.	.0475	.0565
Bunarex Resins	lb.	.06½	.07½
Bunatak AH	lb.	.08	.09
U	lb.	——	.17½
No. 90	lb.	——	.09
No. 210	lb.	——	.14
Burgundy Pitch	lb.	.0843	.0888
Butac	lb.	.11¾	.12¾
Butoxyethyl Diglycol Carbonate	lb.	.40	.41
Butyl Benzyl Sebacate	lb.	.61	.63¼
Butyl Carbitol Perlargonate (dms.)	lb.	——	.64
Butyl Cellosolve Perlargonate (dms.)	lb.	——	.68
Butyl Palmitate	lb.	——	.26½
Butyl Roleate	lb.	.176	.18
Butyl Stearate-CP (dms.)	lb.	.31	.32
BWH-1	lb.	——	.14
Cabflex Di-BA (dms.)	lb.	.42	.44¼
Di-OA (dms.)	lb.	.43½	.46¼
Di-OP (dms.)	lb.	.40	.42¾
R-100	lb.	.04½	.05½
G.P.	lb.	.0125	.02
R-100	lb.	.04½	.05½
TT	lb.	.02	.02¾
Candelilla Wax Prime	lb.	.67	.75
Capryl Benzyl Sebacate	lb.	.67½	.70¼
Carbonex	lb.	.0325	.0375
S Flakes	lb.	.043¼	.05
S Plastic	lb.	.0410	.0460
644	lb.	.0375	.0425
Carbowax 4000 (drums)	lb.	.33	.34
Cardolite 615	lb.	.33¼	.36¼
816	lb.	.25¼	.28¼
Carnauba Wax, Crude	lb.	.95	1.10
Refined	lb.	.87	.94
Substitute	lb.	.45	1.08
Yellow	lb.	1.15	1.20
Celluflex (dms.)	lb.	.34	.35
Ceresine Wax	lb.	.14	.26
Chlorowax 40	lb.	.14	.14¾
Contogum	lb.	.06¼	.10¼
C7LA Polymer	gal.	.17½	.32½
Cumar Resins	lb.	.05½	.14½
D.B.M.	lb.	——	.30
Degras, Common	lb.	——	.12
Dibenzyl Sebacate	lb.	.74	.76¼
Dibutoxethyl Sebacate	lb.	——	.563¼
Dibutyl Phthalate	lb.	.34	.36¼
Dibutyl Sebacate	lb.	.85½	.88¼
Dicapryl Adipate	lb.	.40½	.43¼

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by JOHN M. BALL

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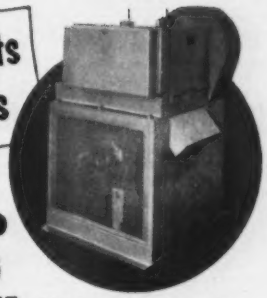

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PLASTICIZERS & SOFTENERS (Cont'd)

Dicapryl Phthalate	lb.	.35	.37¾
Dicapryl Sebacate	lb.	.61½	.64½
Di-Carbitol Phthalate (dms.)	lb.	.42	.42½
Dicyclohexyl Phthalate	lb.	——	.42
Diethyl Phthalate (t.c.)	lb.	.29½	.32¼
Di-2-ethlyhexyl Phthalate (t.c.)		——	.37
Dihexyl Adipate	lb.	.33	.35½
Dihexyl Phthalate	lb.	.28½	.31½
Dihexyl Sebacate	lb.	.50	.52½
Di Isobutyl Azelate (dms.)	lb.	.54	.57
Di-iso-octyl Adipate (dms.)	lb.	.43	.45¾
Di-iso-octyl Phthalate (t.c.)	lb.	.37	.39¾
Dimethyl Phthalate (t.c.)	lb.	.29¼	.30¾
Dimethyl Sebacate	lb.	.77	.79½
Dinopol	lb.	.42¾	.43¾
Dioctyl Phthalate (dms.)	lb.	.37	.39¼
Dioctyl Sebacate (dms.)	lb.	.73¼	.76
D.I.O.P. (dms.)	lb.	.41¼	.42¾
Dipolymer Oil	gal.	——	.33
Dispersing Oil No. 10	lb.	.06	.06¼
Dutrex B	lb.	.02¾	.03¾
5 and 6	lb.	.020	.031
15E	gal.	.10	.20
20, 21, 22 and 25	lb.	——	.04
Elastex 10-P	lb.	.40	.42½
50-B	lb.	.34½	.37
DCHP	lb.	.42½	.43½
Estac	lb.	——	.16
Ethox (dms.)	lb.	.45½	.45¾
Flexol B-400	lb.	.28	.30
DHP	lb.	.46	.48¼
DOP	lb.	.40	.42¼
TOF	lb.	.49	.51¾
3GH	lb.	.44	.46
3GO	lb.	.53	.55
4GO	lb.	.37	.39¼
8HP	lb.	.40	.42¼
Flexricin P-1 (and 4)	lb.	——	.36
P-4C	lb.	——	.46½
P-8	lb.	——	.36
Pale 4	lb.	.27	.28½
Fortex (dms.)	lb.	.12½	.14½
Galex W-100	lb.	.15½	.19¼
G. B. Light Process Oil	lb.	.025	.0325
Medium Process Oil	lb.	.03½	.04¼
G. B. Naphthenic Neutrals	gal.	.11	.18
Good-Rite GP233	lb.	.45¾	.48½
GP261	lb.	.40	.42¾
Harflex 500 (dms.)	lb.	.36½	.39¼
Herron-H.T.	gal.	.16	.27
Herron-Plas	lb.	——	.03¾
Herron-Wax	lb.	.05¼	.06
No. 23	lb.	.08¼	.08¾
No. 24	lb.	.07¾	.07¾
HSC No. 13	lb.	.27	.30
Hylene B	lb.	.45	.50
C	lb.	.41	.46
D	lb.	.47½	.52½
Indonex 632½ (633½, 634½, 638½)	gal.	.1100	.1700
Kapsol	lb.	.34	.35
Kenflex	lb.	.18	.26
Kesscoflex 101 (dms.)	lb.	——	.39
102 (dms.)	lb.	——	.32½
103 (dms.)	lb.	——	.41½
104 (dms.)	lb.	——	.48
105 (dms.)	lb.	——	.33¼
106 (dms.)	lb.	——	.35½
KP 23 (dms.)	lb.	.31	.32
120 (dms.)	lb.	.31	.32
140 (dms.)	lb.	.4774	.4825
201	lb.	.54¼	.55¼
504	lb.	.35¾	.36¼
555	lb.	.33	.33¼
Kremol 40	gal.	.36	.46
Kremol 40	gal.	.39	.49
50	gal.	.39	.49
Kronisol (drums)	lb.	.38¼	.39¼
Kronitex (drums)	lb.	.37¼	.38¼
Lanolin, Tech. Anhydrous	lb.	.23	.25
Lead Oleate	lb.	——	.30½
Lindol (dms.)	lb.	.34	.35
2-Mercaptoethanol (drums)	lb.	1.25	1.50
Methox (dms.)	lb.	.41¼	.41¾
Methyl Laurate	lb.	.25	.27
Methyl Oleate	lb.	——	.20
Methyl Stearate (dms.)	lb.	——	.30
Modicol G	lb.	——	.23
R	lb.	——	.17
Montan Wax, Crude	lb.	.15	.18
Monten Wax	lb.	.12	.13
Monty Wax	lb.	——	.30½
Morflex	lb.	.37	.72½
Natac	lb.	.11¼	.12¼
Nebony Resins (dms.)	lb.	.04	.04½
Neolene 210 (t.c.)	lb.	——	.16
212 (t.c.)	lb.	——	.14
220 (t.c.)	lb.	——	.15
Nerium	lb.	——	.09
Nevillac Resins (dms.)	lb.	.28	.55
Neville Resins (dms.)	lb.	.12	.18
Nevindene Resins (dms.)	lb.	.15	.18
Nevinol (dms.)	lb.	——	.20
Nevoll	lb.	.02½	.03½
Nevtex 10 (dms.)	lb.	.11	.12½
Nuba 1 (and 2) (dms.)	lb.	.05¾	.06¼
3X (dms.)	lb.	.07¾	.08¼
15 (and 30) Oil (dms.)	lb.	.36¼	.38
No. 480 Oil Proof Resin	lb.	——	.18
Ohopex Q10 (dms.)	lb.	.40¾	.41¾
Opalwax	lb.	.37	.38
Ortho-Nitrobiphenyl	lb.	.06	.11
Ozokerite Wax No. 64			
White	lb.	.31	.32
Yellow	lb.	.25	.26

PLASTICIZERS & SOFTENERS (Cont'd)

Palm Oil	lb.	——	.11
Paradene Resins (dms.)	lb.	.06½	.07½
Para Flux (dms.)	gal.	.1925	.2025
2016 (dms.)	gal.	.22	.23
Para Lube (t.c.l.)	lb.	.046	.048
Parmo	lb.	.06	.13½
Pepton 22	lb.	.72	.75
PG-16 (drums)	lb.	——	.22¼
Picco 10 (and 25)	lb.	——	.13½
75 (and 100)	lb.	——	.13
Rubber Resin 100	lb.	.1855	.1905
S.O.S.	gal.	——	.29
Piccocizer 30	lb.	——	.05½
Piccolastic A (and B, C, D, E)	lb.	.28½	.29
FT, FHF and FX	lb.	——	.1815
T-135	lb.	.22¾	.23¼
Piccolyte S Resins	lb.	.18½	.20
Piccolyte WW Resins	lb.	.45	.47
Piccoumaron Resins	lb.	.06¾	.17
Piccovar	lb.	.14½	.15
Piccovol	lb.	——	.02½
Pictar	gal.	——	.25
Pigmentar	lb.	.0410	.0678
Pigmentaroil	lb.	.0410	.0678
Plastac M	lb.	——	.09¼
Plasticizer 2286	lb.	——	.26¼
Plasticizer SC	lb.	.49	.52
Plasticizer W-13	lb.	.37	.38¾
Plasticizer XP-3	lb.	——	.50
Plastoflex 50	lb.	.34	.38
55	lb.	.34	.38
520	lb.	.37½	.38½
VS	lb.	.40	.43
Plastogen	lb.	.07¾	.08
Plastolein 9050 (c.l.)	lb.	.59¼	.62¼
9055	lb.	.37½	.40½
9058	lb.	.57	.60
9250	lb.	.27	.30
9715	lb.	.37½	.40½
Plastone	lb.	.27	.30
Polycin 781	lb.	.40	.41
Polyco 438	lb.	.34	.36
Polymel C-128	lb.	.19½	.20½
D	lb.	.22	.24
H-2	lb.	.22	.24
6	lb.	.06¾	.10
7	gal.	.23	.28
Process Oil C-255 (c.l.)	gal.	——	.22
Propylene Stearate (dms.)	lb.	——	.32
PT 400 Pine tar (600, 800) (t.c., dms.)	lb.	.0410	.0534
PX-104	lb.	.34	.42
PX-108	lb.	.38	.46
PX-208	lb.	.41½	.49
PX-404	lb.	.60	.68
Reogen	lb.	.13¼	.13½
465 Resin (dms.)	lb.	.07	.07½
Resin 731-C	cwt.	——	15.00
Resin C	lb.	.0225	.0310
Resinex	lb.	.03¼	.03¾
L-4	lb.	.02¼	.03
Rexflex	lb.	——	.15
Rosin Oil	gal.	.54	1.20
R.S.O. Softening Oil	lb.	.03	.05
Rubberol	lb.	——	.25¾
Rubtar	gal.	——	.40
Santicizer B-16	lb.	.50	.52
E-15	lb.	.47	.49
M-17	lb.	.44	.46
No. 107	lb.	.40	.42½
No. 140	lb.	.29	.31
No. 141	lb.	.40	.42½
No. 160	lb.	.34	.36
Sherolatum	lb.	.03½	.06
Softener No. 20	gal.	.09	.25
Staflex IXA	lb.	.34	.36
Stanolind Petrolatum	lb.	.048	.086
Wax	lb.	.31	.32¾
Staybelite Resin (dms.)	cwt.	——	12.00
Sunny South Burgundy Pitch	lb.	.0980	.1025
Sunny South Pine Tar	lb.	.0410	.0678
Sunny South Rosin Oil	gal.	.58	.87½
Superla Wax	lb.	.27¾	.32
Syncera Wax	lb.	.19	.24
Syn Tac (c.l.)	gal.	——	.33
Synthetic Revertant Oil	lb.	——	.16
Tar, Refined	gal.	.12	.17
K-Tarnel NR (t.c.)	lb.	——	.0851
Terpene A	gal.	——	.65
TP-90B	lb.	——	.59
TP-95	lb.	——	.65
TP-98	lb.	——	.65
Triacetin	lb.	.34	.45
Tricresyl Phosphate (t.c.)	lb.	.33	.35¾
Turgum S	lb.	.10	.11
Vanadiset A	gal.	.13	.20
Vistac No. 1	gal.	1.00	1.16
P	lb.	.18	.18½
Vopcolene 50	lb.	——	.37
Witresin—Granular	ton	41.00	43.00
Solid	ton	36.00	38.00

PROCESSING AIDS

Calcium Riconoleate	lb.	——	.57
Castor Oil, Processed (dms.)	lb.	——	.35¼
Refined (drums)	lb.	——	.19¼
Castorwax (min. 250 lbs.)	lb.	——	.27¾
Dutrex 7	lb.	.12	.20
ELA	lb.	——	.82¼
Millrex	lb.	——	.15

PROCESSING AIDS (Cont'd)

Polycin 783	lb.	——	.31½
Resin No. 510	lb.	.13½	.16½
Zyrox	lb.	.50	.79

PROTECTIVE & STABILIZING AGENTS

Acacia	lb.	.12¾	.21
Alpha Protein	lb.	.24	.28
Ammonium Alginate	lb.	——	.95
Aroostocrat	lb.	——	.07½
Carob Bean Flour	lb.	——	.46
Casein	lb.	.28	.38
Emcol K-8300 (dms.)	lb.	.19	.20
Ethylene Diamine 68%	lb.	.47	.50
Karaya Gum	lb.	.20	.50
Prosein	lb.	.0600	.0630
Rex Compound No. 2801	lb.	——	.15
Stablex B	lb.	.50	.95
K	lb.	.27	.35

RECLAIMING AGENTS

Armeen C	lb.	.50	.58
T	lb.	.42	.50
No. 517 H.B. Oil	gal.	.11½	.16½
535	gal.	.22	.27
Burco RA	lb.	.05½	.08¼
C-6 Oil (and 28, 32)	gal.	.33	.38
C-10 Oil	gal.	.25	.30
C-33 Oil	gal.	——	.21½
Caustic Soda—Flake 76% (c.l., drums)	cwt.	——	3.75
Liquid 50% (t.c.)	cwt.	——	2.55
Solid 76% (c.l., dms.)	cwt.	——	3.35
Cresylic Acid (99-100%)	gal.	1.20	1.39
D-4	gal.	——	.27
E-5	gal.	——	.25
G. B. Reclaiming Oil	gal.	.12	.18
CD-10	gal.	.10	.16
CD-50-U	gal.	.18	.24
Gensol No. 6 (t.c.)	gal.	——	.45
Heavy Aromatic Naphtha	gal.	——	.12¼
LX-77 Reclaiming Solvent	gal.	.21	.33
LX-572 Reclaiming Oil	gal.	.27	.32
LX-777 Reclaiming Oil	gal.	.23	.33
Neo-Fat D-242	lb.	.05½	.07¾
PRR 1	gal.	.15	.35
PT 67 Light pine oil	gal.	.50	.60
PT 101 Pine tar oil	lb.	.0410	.0534
Q Oil	gal.	——	.286
Reclaiming Oil 1621	lb.	.03	.04
Reclaiming Oil 3186 (t.c.)	gal.	.28	.38½
Reclaiming Oil 3186-G.	gal.	.25	.36½
Reclaiming Reagent No. 4	lb.	.12	.15
R.P.A. No. 3	lb	——	.46
RR-10	lb.	——	.35
Soda Ash (c.l., bags)	cwt.	——	1.50
Solvent 534	gal.	.20½	.26½
Solvent Oil 21	gal.	.24	.29
C-42	gal.	.23	.28
Union Solvent 4060-O	gal.	——	.149
X-1 Resinous Oil	lb.	.0210	.0275

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Atlantic HPC-98	lb.	.0740	.1225
Continental F	lb.	.0740	.1225
Croflex	lb.	.0740	.1225
Dixiedensed (and S)	lb.	.0740	.1225
Kosmobile (and S)	lb.	.0740	.1225
Micronex HPC	lb.	.0740	.1225
Spheron 4	lb.	.0740	.1225
Witco Disperso No. 6	lb.	.0740	.1225

Channel, Medium Processing (MPC) (bags)

Atlantic MPC-95	lb.	.0740	.1225
Continental A	lb.	.0740	.1225
Croflex TH	lb.	.0740	.1225
Dixiedensed HM (and S-66)	lb.	.0740	.1225
Huber Arrow TX	lb.	.0740	.1225
Kosmobile HM (and S-66)	lb.	.0740	.1225
Micronex Standard	lb.	.0740	.1225
Spheron 6	lb.	.0740	.1225
Texas M	lb.	.0740	.1225
Witco Disperso No. 1	lb.	.0740	.1225

Channel, Easy Processing (EPC) (bags)

Atlantic EPC E-42	lb.	.0740	.1225
Continental AA	lb.	.0740	.1225
Croflex 77	lb.	.0740	.1225
Dixiedensed 77	lb.	.0740	.1225
Kosmobile 77	lb.	.0740	.1225
Micronex W-6	lb.	.0740	.1225
Spheron 9	lb.	.0740	.1225
Texas E	lb.	.0740	.1225
Witco Disperso No. 12	lb.	.0740	.1225
Wyex	lb.	.0740	.1225

Channel, Conductive (CC) (bags)

Continental R-40	lb.	.1800	.2400
Dixie 5 Dustless	lb.	.0950	.1550
Dixie Voltex	lb.	.1950	.2500
Kosmink Dustless	lb.	.0950	.1550
Kosmos Voltex	lb.	.1950	.2500
Spheron C	lb.	.1400	.1850
Spheron N	lb.	.2500	.3000
Voltex	lb.	.1950	.2500

Conductive Furnace Black (CFB) (bags)

Aromex 115	lb.	.0890	.1290
Shawinigan Acetylene Black	lb.	.1600	.2200
Vulcan C	lb.	——	.1100

Furnace, Fast Extruding (FEF) (bags)

Arovel	lb.	.0600	.1000
Croflex 50	lb.	.0600	.1000
Dixie 50	lb.	.0600	.1000
Kosmos 50	lb.	.0600	.1000
Statex M	lb.	.0600	.1000
Sterling SO	lb.	.0600	.1000

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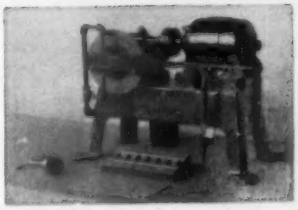

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REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace, General Purpose (GPF) (bags)

Sterling V	lb.	.0500 -	.0900

Furnace, High Modulus (HMF) (bags)

Collocarb	lb.	.0550 -	.0950
Continex HMF	lb.	.0550 -	.0950
Croflex 40	lb.	.0550 -	.0950
Dixie 40	lb.	.0550 -	.0950
Kosmos 40	lb.	.0550 -	.0950
Modulex	lb.	.0550 -	.0950
Statex 93	lb.	.0550 -	.0950
930	lb.	.0470 -	.0870
Sterling L	lb.	.0550 -	.0950

Furnace, Medium Abrasion (MAF) (bags)

Philblack A	lb.	.0600 -	.1000

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF	lb.	.0400 -	.0800
Croflex 20	lb.	.0400 -	.0800
Dixie 20	lb.	.0400 -	.0800
Essex	lb.	.0400 -	.0800
Furnex	lb.	.0400 -	.0800
Gastex	lb.	.0450 -	.0850
Kosmos 20	lb.	.0400 -	.0800
Pelletex	lb.	.0400 -	.0800
Sterling NS	lb.	.0400 -	.0800
Sterling R	lb.	.0450 -	.0850
Sterling S	lb.	.0400 -	.0800

Furnace, Fine (FF) (bags)

Statex B	lb.	.0650 -	.1050
Sterling 99	lb.	.0650 -	.1050

Furnace, High Abrasion (HAF) (bags)

Aromex	**lb.**	**.0790 -**	**.1250**
115	lb.	.0890 -	.1290
Continex HAF	lb.	.0790 -	.1250
Croflex 60	lb.	.0790 -	.1175
Dixie 60	lb.	.0790 -	.1175
Kosmos 60	lb.	.0790 -	.1175
Philblack O	lb.	.0790 -	.1190
Statex R	**lb.**	**.0790 -**	**.1250**
Vulcan 3	**lb.**	**.0790 -**	**.1220**

Furnace, Super Abrasion (SAF) (bags)

Philblack E	lb.	.1350 -	.1750
Statex 125	lb.	.1100 -	.1550

Thermal, Fine (FT) bags)

P-33 (c.l.)	lb.	—— -	.0550

Thermal, Medium (MT) (bags)

Sterling MT (c.l.)	lb.	—— -	.0350
Thermax (c.l.)	lb.	—— -	.0350
Thermax, Stainless (c.l.)	lb.	—— -	.0450

REINFORCING AGENTS—SILICA

Hi-Sil	lb.	.10 -	.11½

REINFORCING AGENTS—MISCELLANEOUS

Darex Copolymer No. 3	lb.	.47 -	.49
X34	lb.	.42 -	.44
X43 (and 43E)	lb.	.42 -	.44
Darex Copolymer Latex No. 3-L (and X34L)	lb.	.36½ -	.39
Durez 12687 (and 12707)	lb	—— -	.37
Durez 13355	lb.	—— -	.29½
Good-Rite Resin 50	lb.	.42 -	.44
Kralac A	lb.	.43 -	.44
Marbon S and S-1	lb.	.42 -	.49
8000	lb.	.42 -	.49
Marmix	lb.	.42 -	.49
Pliolite Latex 190	**lb.**	**.30 -**	**.34**
Pliolite NR	**lb.**	**.74 -**	**.76**
Pliolite S3, S6, and S6B	lb.	.43 -	.44
C-3 Masterbatch	lb.	.58 -	.59
C-4 Masterbatch	lb.	.56 -	.57
G Masterbatch	lb.	.45 -	.46
G50 Masterbatch	lb.	.45 -	.46
N Masterbatch	lb.	.49 -	.50
R Masterbatch	lb.	.63 -	.64
WA	lb.	.68 -	.75
S113V76	lb.	.48 -	.55
Polyco 220	lb.	.22 -	.23
Zeolex 20	ton	120.00 -	140.00

RETARDERS

Dutch Boy Normasal	lb.	—— -	.46
ESEN	lb.	.35 -	.37
Retarder ASA	lb.	.35 -	.37
Retarder PD	lb.	.35 -	.37
Retarder T.C.M.	lb.	—— -	.65
Retarder W	lb.	—— -	.44½
Retardex	**lb.**	**.47 -**	**.50**

RUBBER SUBSTITUTES

Mineral Rubber

38	**ton**	**38.00 -**	**40.00**
Black Diamond	**ton**	**38.00 -**	**40.00**
Ryerlyte	**ton**	**47.00 -**	**54.00**
Gilsonite, Selects (c.l.)	ton	37.00 -	38.00
Hard Hydrocarbon (dms.)	ton	46.50 -	48.50
Herron Flake	**ton**	—— -	**45.00**
Mineral Rubber, solid	**ton**	**42.50 -**	**44.50**
Pioneer	**ton**	**35.00 -**	**46.00**

Vulcanized Vegetable Oils (Factice)

Amberex	lb.	.29 -	.36
Brown	lb.	.1425 -	.2680
Dispersed	lb.	.26 -	.42
Neophax	lb.	.1570 -	.2680
White	lb.	.1440 -	.2850

Miscellaneous Rubber Substitutes

G B. Asphaltenes	lb.	.06 -	.06½
Gilsowax B	lb.	.09 -	.11
Resin No. 1098 (drums)	lb.	—— -	.62
No. 1198	lb.	.46¾ -	.49¾

SOLVENTS

Acetone (dlvd.)	lb.	.08½ -	.11
American Dipentine	gal.	.44½ -	.68
American Pine Oil	**gal.**	**.75½ -**	**.95½**
Amsco Lactol Spirits (t.c.)	gal.	—— -	.18
Rubber Solvent (t.c.)	gal.	—— -	.17
Solv A (t.c.)	gal.	—— -	.25½
Solv A-80 (t.c.)	gal.	—— -	.30½
Solv B (t.c.)	gal.	—— -	.29
Solv B-90 (t.c.)	gal.	—— -	.32
Solv D (t.c.)	gal.	—— -	.30½
Special Naphthalite (t.c.)	gal.	—— -	.17
Textile Spirits (t.c.)	gal.	—— -	.18
Amyl Chlorides, Mixed (l.c.l.) (drums)	lb.	.10 -	.11
Benzol 90%	gal.	—— -	.48
Butyl Acetate (t.c.)	lb.	.15¼ -	.17¾
Butyl Alcohol (t.c.)	lb.	.16 -	.18½
Secondary (dlvd.)	lb.	.11 -	.13½
Tertiary (dlvd.)	**lb.**	**12 -**	**.14½**
Carbon Bisulfide, Tech.	**lb.**	**.0440 -**	**.0800**
Carbon Tetrachloride	**lb.**	**.08 -**	**.08½**
Cosol 1	gal.	.37 -	.43
Cosol 2	gal.	.42 -	.48
Cyclohexane	**lb.**	**.09¼ -**	**.11¾**
Cyclohexanone	lb.	.25 -	.27 [a]
Diacetone, Pure (dlvd.)	lb.	.12 -	.14½
Dichlorethyl Ether (dms.)	lb.	.15 -	.17
Formal (dms.)	lb.	.29¾ -	.31¾
Dichloropentane (l.c.l.)	lb.	.04 -	.07
Dicom	**gal.**	**.30 -**	**.42**
Halowax Oil	lb.	.28 -	.41
Heptanes (t.c.)	gal.	.17 -	.22
Hexalin Cyclohexanol	**lb.**	**.20 -**	**.22** [a]
Hexanes (t.c.)	gal.	.17 -	.22
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.43 -	.60
Ether, Ref. (dlvd.)	gal.	.05 -	.07½
Mesityl Oxide (dlvd.)	lb.	.11½ -	.14
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.54½ -	.72¼
Methyl Ethyl Ketone	lb.	.11 -	.13½
Methyl Isobutyl Ketone (dlvd.)	lb.	.13 -	.15½
N-5 Pentane Mix. (t.c.)	**gal.**	—— -	**.13½**
N-6 Hexanes (t.c.)	gal.	—— -	.14½
N-7 Hexanes (t.c.)	gal.	—— -	.13½
Penetrell	gal.	.44½ -	.68
Petrolene (t.c.)	gal.	—— -	.13125
Picolines, Alpha, Refined	lb.	—— -	.40
Mixed	lb.	—— -	.30
Proprietary Alcohol (t.c.)	gal.	—— -	.43½
Pyridine, Refined	lb.	—— -	1.05
Quinoline	lb.	—— -	.61¼
Rubber Solvent (t.c.)	gal.	—— -	.16
Rubsol (t.c.)	gal.	—— -	.11875
Skellysolve B (Hexanes) (t.c.)	**gal.**	—— -	**.148**
C (Heptanes) (t.c.)	gal.	—— -	.141
E (Octanes) (t.c.)	**gal.**	—— -	**.155**
R (Solvent Naphtha)	gal.	—— -	.114
Solvent, Crude, Light	gal.	.19 -	.28
Solvesso 100 (t.c.)	**gal.**	—— -	**.28**
150 (t.c.)	gal.	—— -	.28
Sunny South Dipentine	gal.	.44½ -	.68
Sunny South Pine Oil	gal.	.75½ -	.95½
Sunray	gal.	.1140 -	.1600
Toluene (drums)	**gal.**	—— -	**.28**
Toluol (t.c.)	gal.	—— -	.45
Trichlorethane	lb.	.11½ -	.13½
Triglycol Dichloride (dms.)	lb.	.59½ -	.60½
Union Thinner 1	gal.	—— -	.163
3	gal.	—— -	.165
5	gal.	—— -	.153
7	gal.	—— -	.153
2-50-W Hi-Flash	gal.	—— -	.41
X-7 Sp. Heptanes (t.c.)	gal.	—— -	.11
Xylol	gal.	—— -	.45

STABILIZING AGENTS (for Vinyl Resins)

Basic Silicate White Lead	lb.	.1550 -	.2000
Bunatak Polymer No. 780	lb.	—— -	.04
No. 5514	lb.	—— -	.35
BVS	lb.	—— -	.74¾
Cadmium Stearate	lb.	—— -	1.25
Dutch Boy DS-207	lb.	—— -	.54
Plumb-O-Sil A	lb.	—— -	.29¾
B	lb.	—— -	.31¼
Tribase	lb.	—— -	.27¼
Dythal	lb.	—— -	.41
Ferro	lb.	.65 -	1.35
Lead Stearate, Precip.	**lb.**	**.36 -**	**.38**
Fused	lb.	—— -	.35½
Lithium Stearate	lb.	.63 -	.65
Stabelan E	lb.	1.25 -	1.40
XL	lb.	.55 -	.65
Stabilizer No. 3	lb.	—— -	2.15
Stabilizer No. 21	lb.	—— -	1.08
Stabilizer No. 52	lb.	—— -	2.15
Stabilizer No. 89	lb.	—— -	.75
Stabilizer No. 143	lb.	—— -	.85
Stabilizer BC-12	lb.	—— -	.90
Stabilizer B-5	lb.	—— -	.70
Stabilizer CH-14	lb.	—— -	.65
Stabilizer E6B	lb.	—— -	.95
Stabilizer ICX	lb.	—— -	.68
Stabilizer L	lb.	—— -	.60
Stabilizer OM-10	lb.	—— -	2.15
Stabilizer OM-18	lb.	—— -	3.65
Stabilizer SN	lb.	—— -	.48
Stabilizer V-1-N	lb.	—— -	.45
Stabilizer V-9	lb.	—— -	.85
Stabilizer VL-2	lb.	—— -	1.27
Stabilizer VL-3	lb.	—— -	1.18

STABILIZING AGENTS (Cont'd)

Stabilizer V-7939	**lb.**	—— -	**.68**
Staycin 1	lb.	—— -	.65
Vanstay L	lb.	.33 -	.35
H	lb.	.75 -	.77
HH	lb.	.98 -	1.00

SUN CHECKING AGENTS

Antisol	lb.	—— -	.23
Antisun	lb.	—— -	.18½
Heliozone	lb.	.26 -	.27
NBC	lb.	—— -	1.55
Sharples Wax	**lb.**	**.23 -**	**.28**
Sunolite	**lb.**	**.20 -**	**.23**
Sunproof	**lb.**	**.25 -**	**.26**
Imp.	**lb.**	**.23 -**	**.24**
Jr.	**lb.**	**.18 -**	**.19**
Tonox	lb.	.51½ -	.53½

TACKIFIERS

Arcco 620-32B	lb.	.20 -	.21
716-30	lb.	.19½ -	.20½
1041-21	lb.	.17½ -	.18½
Galex (drums)	lb.	.15½ -	.19¼
Indopol H-300	gal.	1.00 -	1.16
Koresin	lb.	**.73 -**	**.75**
Liquid Rubber Flux	lb.	—— -	.14
Nilox (c.l.)	cwt.	—— -	15.00
Resin V	**lb.**	—— -	**.23¼**
Rubtack	**lb.**	—— -	**.12**
Synthol	lb.	—— -	.24¾
Vistac No. 1	**gal.**	**1.00 -**	**1.16**
A	lb.	.21½ -	.22¾
Zirex (c.l.)	cwt.	—— -	15.00

THICKENERS (FOR LATEX)

Alcogum AN-6	lb.	—— -	.05
AN-10	lb.	—— -	.08½
Betanol (drums)	**lb.**	—— -	**.76**
Emcol PL50-3 (dms.)	lb.	—— -	.57
Emulsorex No. 5	**lb.**	—— -	**.35**
Lecithin	lb.	.12 -	.17
Modicol VD	**lb.**	—— -	**.12½**
VE	**lb.**	—— -	**.10¾**
VF	**lb.**	—— -	**.10¾**
VK	**lb.**	—— -	**.07**
Polyco 296	lb.	.15 -	.16
296-N	lb.	.15 -	.16
Propylene Laurate (dms.)	lb.	**.57 -**	**.67**
Sodium Silicate	cwt.	**1.50 -**	**2.65**

VULCANIZING AGENTS

Selenium

Ancasal*	**lb.**	—— -	**2.00**
Vandex	lb.	—— -	3.50

Sulfur

Blackbird	cwt.	—— -	2.30
Crystex	**lb.**	**.19½ -**	**.23**
Darex Dispersed Sulphur	lb.	.12 -	.17
Devil (c.l.)	cwt.	—— -	1.75
Dispersed Sulfur	lb.	.12½ -	.14½
Insoluble Sulfur 60	lb.	.12½ -	.13
Spider	cwt.	—— -	2.30
Star (c.l.)	cwt.	—— -	2.25
Tire (c.l.)	**cwt.**	—— -	**1.75**
Tube	**cwt.**	—— -	**2.25**
Vultac 2	lb.	.47 -	.49
3	lb.	.51 -	.53

Tellurium

Ancatel*	**lb.**	—— -	**2.00**
Telloy	lb.	—— -	2.50

WETTING AGENTS

Advawet No. 10	lb.	—— -	.20
No. 15	lb.	—— -	.21½
No. 33	lb.	—— -	.48
Aerosol OT 70% Clear	**lb.**	**.80 -**	**1.00**
Alrosol (dms.)	lb.	—— -	.40
Alrosperse	lb.	—— -	.18
Aquarex D	lb.	—— -	.80
MDL Paste	lb.	—— -	.33
ME	lb.	—— -	.97
NS	**lb.**	—— -	**.60**
WA Paste	lb.	—— -	.28
Areskap 50	lb.	.30 -	.38
Dry 100	lb.	.60 -	.72
Aresket 240	lb.	.30 -	.38
Dry 300	lb.	.60 -	.72
Aresklene 375	lb.	.42 -	.57
Dry 400	lb.	.70 -	.84
Armacs	lb.	.29 -	.76
Arquads	**lb.**	**.21 -**	**.61**
Emcol 5100 (dms.)	lb.	—— -	.38
5130 (dms.)	lb.	—— -	.38
Etho-chemicals	lb.	.34 -	.80
Kessco E-122 (dms.)	lb.	—— -	.49
Lecithin	**lb.**	**.18 -**	**.26**
Modicol L	**lb.**	—— -	**.58**
N	**lb.**	—— -	**.40**
S	lb.	—— -	.32
Nekal NS	lb.	—— -	.28
Nopco 1086-A	**lb.**	**.42 -**	**.50**
1187-X	lb.	—— -	.14¼
Parnol	lb.	.13 -	.18
Santomerse D	lb.	.44 -	.65
S	lb.	.13 -	.25
Sorapon SB	lb.	.14 -	.15
SF Conc.	lb.	.29 -	.30
Sorbit P	lb.	—— -	.25
Stablex G	**lb.**	**.50 -**	**.70**
Tergitol 4 (dms., dlvd.)	lb.	.30 -	.31
7 (dms., dlvd.)	lb.	.42 -	.43
O8 (dms., dlvd.)	lb.	.30 -	.31
P28 (dms., dlvd.)	lb.	.18½ -	.19
Trenamine W-30	**lb.**	—— -	**.15**
Vultamol	lb.	—— -	.17½
Wetsit Conc.	lb.	**.25 -**	**.32**

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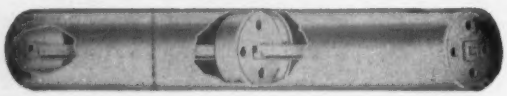

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